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The AUTOMOBILE

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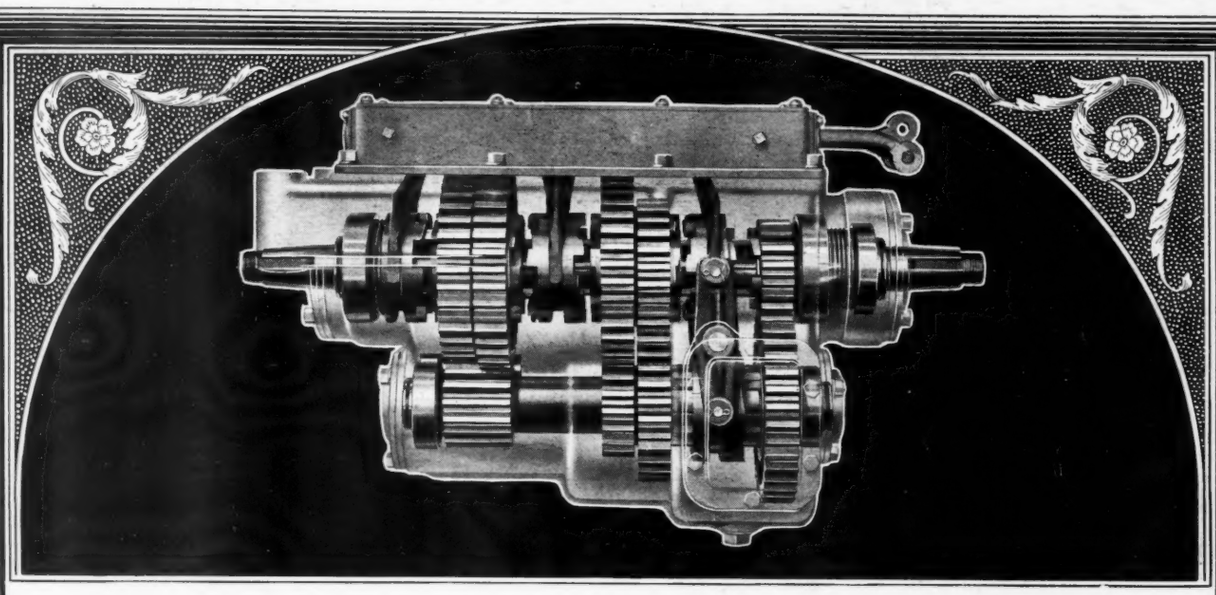

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COTTA Jaw-Clutch Transmission is a surprisingly potent factor in the sale of trucks and tractors. Investigation reveals this. Buyers appreciate what it means to be able to change speeds without shifting gears—for COTTA Transmission Gears are always in mesh.

Speed changes are made through the engagement of jaw-clutches on the sides of the gears. COTTA Transmissions are patented—made in 3 and 4 speeds for trucks and 2 and 3 speeds for tractors. Information on request.

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TRUCK-TRACTOR TRANSMISSIONS

Gears Always in Mesh

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Some Cold Facts on Winter Business in Stewart CUSTOM BILT NECESSITIES

SALES do not go down with temperature. Orders received for Stewart Products for October, November and December shipment will equal, or exceed, the sales of April, May and June, 1919. This is an indication of the business in sight for Stewart Products dealers this winter.

Motor improvements, winter tops, car comforts, have made winter motoring as popular as summer driving.

Dealers and motorists now realize one other thing. Stewart Necessities are as essential during the cold months as in the summer season.

Winter Actually ADDS VALUE to Every One of the Stewart "Big Ten" Products

Icy streets and traffic congestion make the Stewart Autoguard and Warning Signal of prime importance.

Stewart Spark Plugs and Vacuum System are of invaluable aid in starting a cold motor.

The early darkness of winter afternoons means a most urgent need for a Stewart Searchlight.

Don't allow your business to become lax. Winter is the time when you can put all your energy into selling Stewart Custombilt Necessities. It will pay you.

Stewart-Warner Speedometer Corporation
Chicago, U. S. A.

1919 DECEMBER 1919

SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
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1920 JANUARY 1920

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1920 FEBRUARY 1920

SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.
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Good Months For Stewart Sales

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLI NEW YORK—THURSDAY, NOVEMBER 6, 1919—CHICAGO No. 19

Automotive Outlook in Canada

This instructive and interesting review of the automotive manufacturing and sales outlook in Canada was prepared for this publication by G. C. Porter, a newspaper man of standing and an investigator of several years experience. He is a resident of Winnipeg and for several years has specialized in Western Canada information. There is no doubt that this section of the Dominion will have much to say in the politics of that country and for that reason the sentiment there is important

ACTIVITIES of manufacturers through the Dominion of Canada have been somewhat restricted in 1919. Labor unrest has been a factor, but the chief contributing feature has been the uncertainty surrounding the customs tariff. The automobile industry affords probably the most striking example of the way these influences have operated. Approximately a customs duty of fifty-five per cent is levied upon all automobiles imported into Canada. This is, of course, the machine complete in every detail. The ten per cent additional war tax is of little consequence today, in as much as it will not survive many months the diplomatic conclusion of hostilities. On automobile trucks, tractors and other machinery relating to the automotive industry, the duty grades downward around twenty-seven per cent.

Until this year no automobile, complete, has been manufactured in Canada, except one small car. At present one large American concern, manufacturing a high-priced car, has a large factory well under way in Ontario, and one other United States corporation has made some progress in constructing a plant on this side.

There are some tractors, however, made complete in this market. American concerns have, of course, reaped the chief benefits of the Dominion automobile business. Few British and French cars are sold in Canada and, through the West particularly, salesmen from south of the border monopolize this territory.

With some ingenuity and boundless energy, the United States manufacturers have reduced this customs tariff handicap somewhat by establishing factories on this side for assembling their machines, even manufacturing certain parts on this side to further reduce the tariff toll.

Much comment has surrounded the problem of just

why the American manufacturers of cars have hesitated to construct plants north of the Forty-ninth Parallel to take advantage of this rich field and the stiff tariff. Generally, it seems to be a question of instability of the duty as a national policy of the Dominion which has interfered with what would appear to be the logical tendency of the industry to gravitate toward this side of the line. Of late this question, undoubtedly, has projected itself aggressively into the situation, due to the extraordinary advance of the great politico-agrarian organization commonly known as the Grain Growers' Association. And it is not without reason that those whose business may be affected one way or the other by tariff changes should scrutinize these new forces on the political horizon with more or less concern.

The Agrarian Strength

In considerable measure, these forces are unknown quantities. Their chief strength rests on the prairies, composing the vast agricultural provinces of Manitoba, Saskatchewan and Alberta. They are practically in control of the provincial government machinery of the three and, on Oct. 20, in the Ontario provincial election, they secured forty-four seats where they had but two previously. This practically gives them control in that old bulwark of tariff protectionists.

These circumstances, of course, reflect directly the influence of the farmers' organization in federal politics. The first federal contest in which the Grain Growers tested the popularity of their so-called "New National Party" occurred in October at Saskatchewan. There was a bye-election for the Federal house in the ancient Liberal constituency of Assiniboia. In 1917 this seat was captured by the Unionists by a majority of 3,500 in a total vote of 8,000. This October the sentiment had swung so sharply against the high tariff forces, and particularly as it is expressed by the Union government now in power at Ottawa, that the Grain Grower candidate took the seat without even opposition from the Union Government.

True, an old line Liberal, a low tariff advocate, did oppose the Grain Grower. He stood for moderate revision of the tariff and many of the ideas that the Grain Growers advocated, but he was defeated, and that, too, in spite of the fact that this man, Hon. W. R. Motherwell, was the father of the Grain Grower movement in Canada and had called the first convention which organized a branch of the farmers' society.

This suggests how determined the Grain Growers are to gain political power and to put their ideas of political economy into force. The prairie provinces supply the great market of the future for automobiles, trucks and tractors. Records show that today the prairies own an average of one automobile for each sixteen adults, but these Canadian prairies are not as thickly populated as Nebraska and Kansas were thirty-five years ago. So, with the increased settlement, now well under way, Manitoba, Saskatchewan and Alberta will consume for the next twenty years huge numbers of cars, more tractors and a variety of trucks. This means obviously that the men and women these prairies send to Ottawa to make laws will favor a low tariff if not actual free trade in such products. But, numerically, their voting power will be relatively small. Manitoba and Saskatchewan each have sixteen federal representatives at present and Alberta twelve. Of course, with increased population this number will be enlarged, but there can not be another redistribution for ten years. So, for that time it is a known quantity.

The other western province—British Columbia—enjoys twelve seats, but the coast province is a high tariff province. Everything they have in the way of natural resources—coal, minerals, oils, fish, lumber and wool—come into active competition with American products, and while they have no manufacturing industries to speak of, they are in the protection ranks. The chief manufacturing industries of the Dominion are located in Ontario and Quebec, where lies the great preponderance of voting power. In the last analysis the politicians have been forced to recognize this fact and to trim their sails accordingly. In 1911, the late Sir Wilfrid Laurier, leader of the Liberal party and the most magnetic personality Canada has produced in a half century, went to political destruction on his so-called "reciprocity pact" with the United States. This verdict may be appraised as the true measure of national tariff sentiment and the high-water mark of protection frenzy.

The election of 1917 was a federal contest, but consciption was the only issue, and this cannot be regarded as in any sense relating to tariff policy. Politically it is without friends and hope of future. Still, it is in power and cannot apparently be shaken loose before its constitutional term expires in 1923. Though it contains men from all parties and many really able men, it is a high tariff government. It is significant, too, that John Maharg, president of the Saskatchewan Grain Growers' Association, a member of this Union government, voted for the high tariff budget of the Union government and supported the Union policy unequivocally, while, at the same time, T. A. Crerar, president of the Manitoba Grain Growers, resigned his portfolio as Minister of Agriculture and opposed the government in Parliament upon this same tariff issue. So here is the Grain Growers divided at the top.

Conflicting Elements

But any American manufacturer of automobiles who contemplates locating a plant north of the line, where he may take advantage of this tariff wall, will do well to study the psychology of this Grain Growers' uprising in the light of history as well as of present circumstances. There are some painfully conflicting elements in the situation developing out of this Agrarian revolution in the Dominion of Canada (meaning, of course, revolution in the sense of evolution and not by resort to violence). The basis of the organization first is that to be an active member one must derive at least sixty per cent of his income from the soil. But to be a member of the new National Party no such restriction is imposed. If an elector supports the policy of the Grain Growers' Association, he may be enrolled as a member of the New National Party. Here is the rock on which the old Populist organization went to pieces in Kansas and Nebraska in the early 90's after attaining infinitely more success than these Canadian farmers have secured. Will history repeat itself north of the Forty-ninth Parallel? The forces acting and reacting on this situation are quite identical with that which flowed over the Central West thirty years ago. Perhaps these farmers will have profited by that experience.

The United States manufacturer can rely with reasonable certainty upon one thing—that there undoubtedly will be some general reductions in the tariff as it applies to cars, trucks and tractors. The high-priced passenger car will not be included in this reduction, but the medium-priced car will, and everything points to the admission of tractors and trucks, perhaps, free of duty or with a nominal tax.

The dominating cry of the farmer-politician is "free farm implements." The federal government broke the ice in 1917-18 by admitting free of duty tractors of less than $1,400 selling price to the farmer f.o.b. Winnipeg. That

tariff has now been restored and the suspension was merely to speed up production during the war. Still, where less than 2,000 of these small tractors were in use at that time in Manitoba, some eight thousand came in under this new rule, suggesting how much of a handicap the tariff on these farm implement machines is.

To offset this rising tide behind the farmer-labor low tariff movement, there is, generally speaking, an abiding conviction in Canada that political independence and commercial independence are closely allied and that, without a high tariff wall to the south, the progressive, ingenious Yankee would make such trade penetration into British North America that ultimately his flag might follow. This sentiment was unquestionably the basis of the annihilation suffered by the Liberal Party in 1911 after 15 years of uninterrupted government control. It is not at all unlikely that the social unrest incident to the high cost of living may overcome this fear of American trade penetration sufficiently to place the free trade element in power at Ottawa, but the judgment of the writer, based upon twenty years' experience in Canada, ten years of which was spent as editor and managing editor of one of the chief dailies of the country, is that, even if this does occur, the pendulum will swing back to high tariff at the conclusion of that time. The manufacturer who contemplates locating an automobile plant in Canada may rely that, with the possible exception of a few years between 1923 and 1928, he will have a tariff wall to protect him from competition of manufacturers located south of the international border.

But the West will be his market and the West has no roads—that is, no roads as the American manufacturer understands roads. That means the light car and the medium-priced car will dominate this market for the next fifteen years. The same is true of the truck—the one and two-ton truck is chiefly in demand. And in field tractors the big machine of the $5,000 variety has been tried out on these prairies and found wanting. The complaint is principally that it ties up too much money, requires the presence of an expert all the time, is not practicable on small farms and cannot compete with the small tractor in work other than that of pulling the plow.

The Western Canadian Tractor

The $1,400 tractor is the only one for which a general market is found in Western Canada. The average Western Canadian today is buying cars as a utility, not as a luxury. Motorization of the farms is the big market. The truck demand is but in its infancy today. The big factor that it will be in contributing to transportation is just now stirring the West.

The highways are not of permanent character and the railroads are like those of any other new country. Glance at the map and you will see that these provinces extend north to the Sixty-first Parallel, and for a third of that distance the settlement is confined chiefly to trappers and hunters.

That country is being today pierced with main lines, but the automobile truck and the big passenger car will have to be the feeders for a quarter of a century if adequate service is to be supplied. In fact, the freight truck is in service now in some sections and is growing in favor.

The four western provinces had invested in automobiles during 1918, according to official records, $169,867,272. In Manitoba the average price was $1,459 per car, and the province had cars valued at $34,216,468 on Jan. 1, 1919. In Saskatchewan the average per car was $1,395 and the total invested in cars was $61,154,345. In Alberta the average price per car was $1,544, with a total investment of $49,849,584. In British Columbia the average was $1,875 and the total was $24,646,875.

In 1915 the western provinces showed a gain of 22 per cent in the number of cars in service over 1914. The increase in 1916 over 1915 was 33 per cent. The increase in 1917 was exactly 71 per cent, and in 1918 the advance was 75 per cent. Here is an interesting table showing an analysis of cars registered to September, 1918, for four years:

Province—	1914	1915	1916	1917	1918
Manitoba	7,001	8,812	11,352	17,040	23,452
Saskatchewan ...	8,027	10,225	13,849	31,381	43,811
Alberta	4,728	5,832	9,211	15,025	32,286
British Columbia.	6,688	7,440	8,576	11,386	13,145
Total	26,444	32,309	42,988	74,832	112,694

It is worth noting that, according to the records compiled to October, 1919, and estimated on that basis for the balance of the year, the business in automotive equipment on the prairies alone represents expenditures of $9,909,916. This does not include the estimates on tires, and for 1919 the prairies purchased $22,531,644 worth of tires. The gasoline consumed for the year is estimated at $9,015,520. In this connection the manufacturer should not overlook the important fact that Alberta produced 18,000 barrels of petroleum in 1918 and that the production is increasing. The only known gasoline well in the world is in operation at Okotoks, in Southern Alberta, where 30 barrels of commercial gasoline spout out of the ground daily. The oil fields of Northern Alberta promise the next great sensation in oil and the government is being urged to take over the development and operation of the oil industry as a public utility, holding the wealth as a national asset.

Statistics of Wealth

On Nov. 1, 1918, there were in Manitoba, Saskatchewan and Alberta, 19,777 gas field tractors and 2,000 steam tractors. For the 1918 crop in these three provinces, 8,069,106 acres were cultivated by tractors. It is estimated that the total value of grain on land plowed by tractor on the prairies for 1918 was $293,389,421. The average for 1918 in the three provinces shows but one field tractor for each twelve farms. The records evidence that there are but few two-payment sales made. This huge business is on a cash basis with collections good.

Contemplating the possibilities of the Western Canadian market for this class of business, here are some entertaining figures:

The total surveyed acres in Saskatchewan, Manitoba and Alberta are 201,554,393; unsurveyed land acreage is 143,570,697, and the area known to be suitable for cultivation is 133,215,577. Last year, 32,000,000 acres were in field crops on the prairies.

THE announcement was made from Lima, in the inaugural address of President Leguia that the Government was negotiating with American interests for the installation of water supply, drainage and paving systems for 24 of the largest cities and towns of the Republic.

THE Secretary of War has directed that four light tank battalions be included in plans for reorganization of the National Guard and that there should be included, in any estimates under preparation for the fiscal year beginning July 1, 1920, items for the personnel of these units and for equipment other than tanks.

A Post-War Review of French Automobile Trend

In Mr. Bradley's cable story, sent at the opening of the Paris show, he discussed his first impressions. Now he reviews the show as it bears upon French automobile practice in view of the discussions that accompany such a show. It is interesting to note in this further review how much influence American practice evidently has had on French design

By W. F. Bradley

Paris, Oct. 16.

WRITING on the last day of the Paris Show, the first held in four years, the writer would sum up the outstanding features as follows, and from these the reader can judge how strongly the trend is toward American practice:

1. New high-grade cars.
2. Big increase in the number of six cylinders.
3. Appearance of the eight and the twelve.
4. Adoption of overhead valves and valve mechanism.
5. Unit construction of engine and gearbox.
6. Use of detachable head.
7. Adoption of vacuum fuel feed.
8. Electric lighting and starting on all cars.
9. Tendency to abandon the magneto.
10. Reduction in the number of cone clutches and an increase in the number of disk clutches.
11. Disappearance of the worm drive and a general use of the spiral bevel gear.
12. Decreased use of Hotchkiss drive and increased use of central drive.
13. The coming of front wheel brakes on high-class cars.
14. Extensive adoption of cantilever springs and close attention given to questions of suspension.

A certain number of continental manufacturers appear to be fascinated with the idea of building a car which will be recognized as the world's best. In these cars price is naturally a matter of minor consideration. The leaders in this direction are Hispano-Suiza, Farman, Gnome & Rhone, Lancia, Lorraine Dietrich, Bellanger and Delage.

Before the war, Hispano-Suiza specialized in a light, fast, sporting type of car, and gained a high reputation for this class of production. The firm has entered an entirely new class by the production of a six-cylinder model of 3.94 x 5.50 in., with engine entirely on aviation lines. It has aluminum cylinders with steel liners, overhead valves operated by an overhead camshaft without the use of any intermediate mechanism between cam and valve stem. The engine and gearbox are unit construction with only three speeds. Hotchkiss drive has been abandoned in favor of central drive through a sphere attached to a cross frame member. There is no brake on the transmission, but brakes are fitted on all four wheels. Detail finish on this car is high and weight has been kept down by the use of aluminum, steel stampings, and high-grade alloy steels. The brake drums are aluminum with steel liners. Brake shoes are cast aluminum, as are also the plates enclosing the brake drums.

Henry and Maurice Farman have just come into the automobile industry and are using their airplane engine factory for the production of automobiles, the work of designing being in the hands of Charles R. Waseige, who was a Farman engineer during the war. The car is also a six-cylinder on aviation lines but, instead of aluminum, the cylinders are separate steel forgings with a sheet steel water jacket, the six cylinders being formed into one block by being welded to a base plate. Valves are in the head and are operated by overhead camshaft and enclosed mechanism.

The Gnome & Rhone

Gnome & Rhone built aviation engines almost exclusively during the war and is on various classes of engineering work at the present time. The car which the firm is putting out under its own name is a six-cylinder block of 4.53 x 5.50 in.

There is a great similarity between the engine of this car and that of the Hispano-Suiza. The valves are in the head and have direct operation from the camshaft without intermediate mechanism. The hardened steel disks on which the cams operate have their edges milled and into this fits a locking piece moving up and down with the valve but capable of being disconnected from it. This allows adjustment to be made without the use of any tools.

The camshaft is driven by a vertical shaft and bevel gearing at the front end of the engine. The housing is symmetrical with the water jacket, there being nothing externally to indicate its presence. At the base of the vertical shaft is the oil pump, consequently placed in the front end of the base chamber. Two magnetos, placed to left and right of the cylinder block, are driven by bevel gearing. At the front of the engine, and between it and the radiator, is a platform carrying the electric generator, having a six-blade cast aluminum fan mounted on the forward end of its shaft. The generator shaft is driven by bevel gearing and has a friction coupling. Immediately below the generator bracket is the water pump, also driven from the vertical shaft.

The engine is mounted direct on the frame members and the whole of the space between the cylinder castings is filled in with cast aluminum plates, which are level with the top flange of the frame member. In addition, the aluminum dashboard fits close to the engine base chamber and to the flange between it and the side frame members, so that the only escape for hot air from under the engine housing is through the louvres in the hood. The engineers have gone to considerable pains in carrying out this idea of an air-tight engine housing. Where the steering column goes through the dash there is a cast aluminum flanged sleeve bolted to the dash and to the steering gear box. With the exception of two very short lengths, all the water inlet piping is under the aluminum flanges between engine and frame members. The two magneto control rods are carried under the aluminum plate covering the side frame members and serving as hood attachments. The exhaust manifold is a T-shaped pipe, the vertical portion of which passes straight down through the flange and then rearwards to the exhaust box. The intake manifold is a straight length of pipe passing in front of the six ports. The carbureter is bolted on to the engine flange. The gasoline line is not visible, being underneath the flange.

The same general idea has been followed out in the gearbox and clutch housing. The gearbox is divided in a vertical plane and the two halves are bolted together and connected up to the frame members by aluminum fillers. Everything is flush, or of boxlike construction. There are three speeds and reverse. Immediately behind the gearbox there is a large diameter ribbed brake drum, but no external brake control mechanism is visible, the whole of this being inside the box. The propeller shaft is enclosed but drive only is taken through the springs, which are underslung semi-elliptics of quite normal length but of excessive width. It is understood that the chassis price of the Gnome & Rhone is $10,000 at nominal rate of exchange.

The Lancia

A feature of the Lancia is the adoption of a combination cantilever and semi-elliptic springing, with only one leaf for the latter spring. The cantilever is flexibly attached to the axle by means of a short steel cable with ball ends and the semi-elliptic gives lateral rigidity.

Lorraine Dietrich exhibits sixes only. This again is an overhead valve job, with unit construction of engine and gearbox central drive and forged rear axle with spiral bevel gears. Lorraine Dietrich uses semi-elliptic springs on all the high-class models.

Bellanger built a small number of cars before the war and used the Knight engine imported from England. The factory having grown enormously during the war, the company has launched out into both the high-class and the cheap car trade. There are two high-class cars, similar in general design, but one having four and the other eight cylinders. These are entirely distinct from the lower-priced models. The engineer responsible for them is Mr. Laviolette, a Belgian, whereas the cheap car design has been supervised by Benjamin Briscoe and his engineers with the idea prominently in view of cutting production costs.

The engine of the eight-cylinder Bellanger is distinguished by the use of valves mounted horizontally in the head and operated by enclosed long rocker arms from a central camshaft. It is the only engine of this type built in France, although the same general design of combustion chamber was employed by Delage for his racing cars before the war. There is a considerable similarity in this type of valve mechanism with that of the American Duesenberg. Valve caps are fitted on the outside of the cylinder block, these carrying the spark plugs and also allowing the valves to be dismounted. The exhaust is taken out of the cylinder head and then carried forward before sweeping down and rearwards.

Connecting rods are tubular and forked and pistons are aluminum. Dual Delco ignition is employed, this having two separate distributers and being mounted forward in the angle formed by the two blocks of cylinders. The carbureter is mounted high up in the angle of the two cylinder blocks.

Unit Construction

Unit construction of engine, clutch and gearbox is used in this power plant. Immediately behind the gearbox there is an internal expanding brake, the drum of which is surrounded by a cylindrical housing cut away on its circumference to assist cooling. To the rear face of this housing there is bolted the cast steel spherical housing receiving the sphere at the forward end of the propeller shaft housing. At the front, double semi-elliptic springs are used, these being mounted side by side in pairs and having a common shackle. The advantage claimed is that two springs would never be likely to break together. At the rear cantilever springs are used, the feature of these being the method of attachment to the chassis frame members and to the axle. The two ends of the springs are received in cylindrical housings, in which there are two semi-circular bronze blocks. The springs fit between the two flat faces of these bronze blocks and have a slight sliding motion and the whole is free to oscillate in the housing. In order to keep these bronze blocks in place, a metal cap is screwed into the end of the housing receiving the springs.

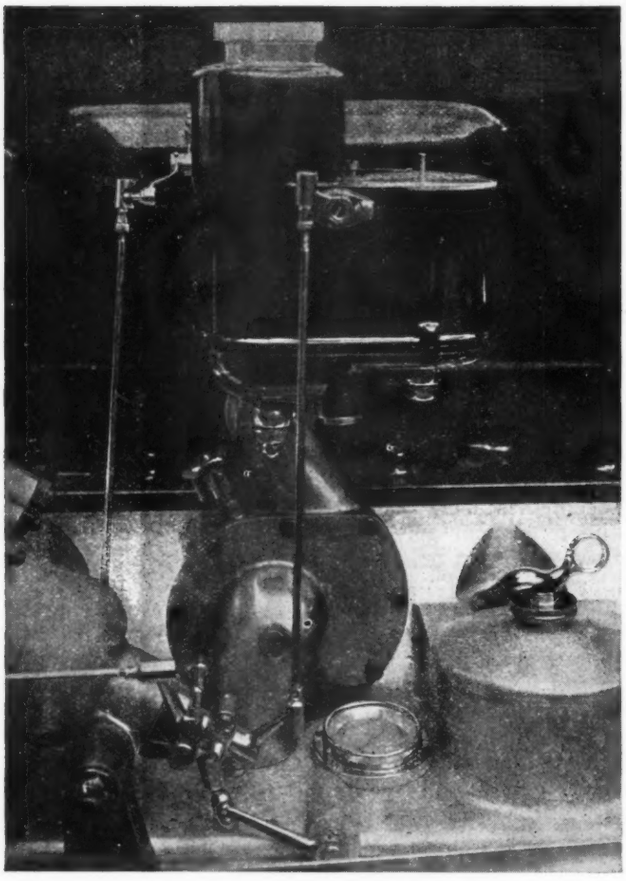
Owing to the angle of the cylinders it is a rather difficult matter to find place for the steering gear. The Bellanger has got over this by mounting the worm and wheel on a heavy cross tube forming a portion of the metal dashboard assembly and by having a long vertical worm wheel shaft contained in a housing and supported both top and bottom. This shaft has mounted on its extremity the lever receiving the fore and aft connecting rod.

Front wheel brakes are employed on the Bellanger. The feature of this is that the horizontal shafts carrying the brake operating cams are mounted in a hollow portion of the axle; the levers on these shafts are behind the axle, and no brake operating mechanism is apparent from an external operation. The rear axle is a banjo type formed of two steel stampings welded together. There is a cast steel housing on the front and an aluminum cover plate on the rear. Spiral bevel gears are used.

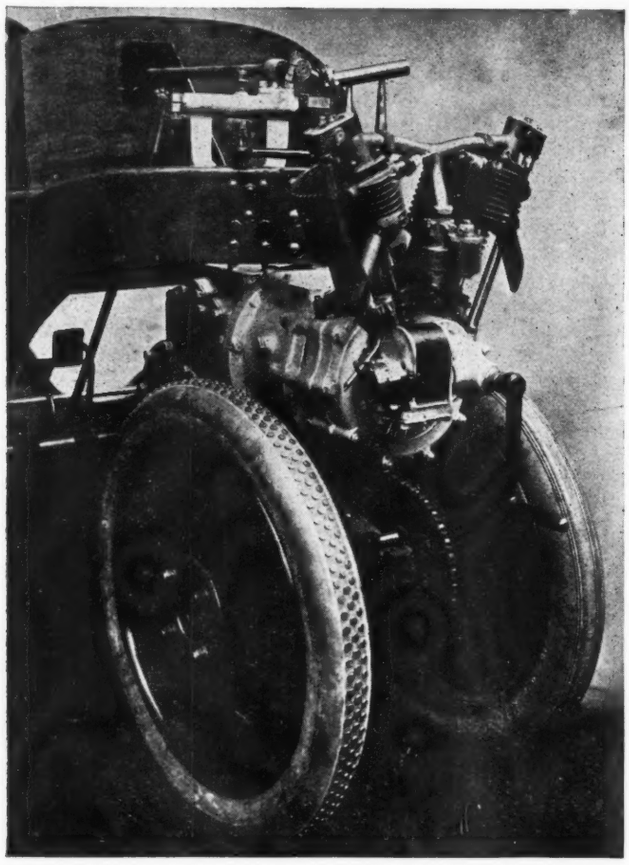
Delage has a high-class car which is not as costly as most of those just mentioned, for, while quality has been sought, an eye has been kept on design with a view to lowering cost of production.

Europe still remains true to the four-cylinder car, but for anything a bit better it has been decided that the number of cylinders must be increased. The majority are in favor of the six, the firms building this type of engine being Bollée, Brassier, Delage, Delaunay-Belleville, Excelsior, Farman, Fiat, Gnome & Rhone, Hispano-Suiza, Lorraine Dietrich, Minerva, Peugeot, Renault, Rochet-Schneider, Spa, Sunbeam, and Wolseley. With the exception of one of the Lorraine Dietrich models, these are costly, high-class cars and the majority have valves in the head.

Eight-cylinder engines are fewer in number, their makers being Bellanger, De Dion Bouton, Darracq, Miesse, Piccard-Pictet, Suere, Isotta-Fraschini, and Dewald. The Miesse, Isotta-Fraschini and Dewald have their cylinders in line; all the others are V engines. These are a varied set: the Suere has a bore of only 45 mm. and is a good



Water pump of Sizaire-Berwick is now placed centrally



Front drive of light delivery vehicle with aircooled engine

production job. The Darracq is a medium-priced car of 3 x 5 in.; the De Dion Boutons are medium-priced also with cylinder bores of 2.36 and 2.75 in. respectively. The others are large and costly.

The twelve is looked upon as an expensive job, which has only been completed up to the present by the Lancia company. Several other firms have experimented with this type of engine but, with the exception of Delaunay-Belleville and Lorraine Dietrich, they do not seem inclined to go ahead with this class of engine.

Overhead Valve Engine

There is no doubt that the overhead valve engine is a coming type. Numerically it is not yet strong, but it has been adopted by firms of such importance that the lead is certain to be followed. In practically every case where the overhead valve is used the car is a high-class one, and the change has been made in order to get more efficiency than it is possible to secure from the best designed L or T head valve engine. There are only two overhead valve engines in the show that do not also have the camshaft above the cylinders. These are a medium priced Lorraine Dietrich, which has valve operation by pushrods, and the Bellanger, with horizontal valves in the head having a valve operating mechanism very similar to the Duesenberg racing engines.

There are three engines with direct valve operating mechanism without the use of followers. They are Hispano-Suiza, Gnome & Rhone, and Dewald. The Hispano-Suiza company claims to have patents on this construction and certainly was the first to use it on the aviation engine brought out late in 1914. This, however, does not appear to have prevented others in both France and England from copying it.

These valves are not mounted in cages, with the exception of the Lorraine Dietrich, which has a bronze cage for the intake and direct seating for the exhaust. All the others have direct seating in the cylinder head. Makers generally appear to be of the opinion that they can now disregard the possibility of damage owing to valve stem breakage. It is noticed that on a number of these cars concentric springs are used, as in aviation practice. In practically all cases the camshafts are hollow and oil troughs are provided for the cams. There is an oil return to the basechamber, and the overhead cover is made oil tight without the use of a gasket. On the Hispano-Suiza, the method adopted is to have a narrow, deep groove on the lower of the two surfaces, with diagonal holes from this groove to the interior of the housing. In this way any oil that seeks to escape through the joint is led into the groove and through the oil returns into the interior of the housing. In the overhead valve cars, Lancia is the only one to use a detachable head.

The Sleeve Valve

With the exception of one of the Peugeot engines, there are no new sleeve valve engines. Panhard, Minerva and Mors continue with the Knight engine. Voisin has taken it up in France and Minerva is manufacturing under Knight license in Belgium. Itala continues its single sleeve valve in Italy and Piccard-Pictet is still using its own type on all its cars. The poppet valve has no new competition, while several of its rivals in pre-war days have disappeared from the field.

Specialists' carbureters are in an immense majority,

among the few firms making their own being Fiat, Renault, Delaunay-Belleville, and Lorraine Dietrich. Intake manifolds are more and more cast with the cylinder block, with air inlet taken from the valve stem chamber or, in certain cases, through the basechamber, this being done on the new Farman and the new Gnome & Rhone. Most generally carbureters are of the two-jet type, without adjustment other than a setting of the cold air inlet.

The Magneto

Devices are general, however, for shutting off all air for starting up from cold, this being done from the driver's seat. On the new Fiats, this is conveniently done by drawing all hot air from the valve stem chamber, with an air inlet into this chamber at the rear of the cylinder casting. A butterfly valve in the mouth of this air inlet allows all the cold air to be shut off when starting up. There are also devices for enriching the mixture from the small jet for starting only, this being returned to its normal condition when the engine is running correctly. Hispano-Suiza and Minerva seem to be the only cars that spray gasoline into the intake manifold.

The magneto is being abandoned very timidly. Marc Birkigt, the Hispano-Suiza engineer, has decided that there is no need for it on one of the most costly cars in the show. In its place he is using a special Delco. Darracq has also taken up the Delco to the exclusion of the magneto. Suere has done the same on a small eight-cylinder car, and Lorraine Dietrich has adopted this policy for one cheap model and retained the magneto for three expensive types. This problem has been attacked from two standpoints. The makers of lower-priced cars decide that they can save money by eliminating the magneto, for they are bound to fit an electric generator to ensure starting and lighting. The manufacturers of high-grade and high-powered cars recognize that electric starting is apt to be difficult, if not a failure, when the magneto has to be relied on for the initial spark. At the same time, they are somewhat afraid to go against public opinion by dropping the magneto and so compromise in most cases by fitting dual ignition. There is every indication, however, that in Europe the magneto will have to meet more and more competition from the generator and battery.

There are practically no cars without electric lighting and starting. European purchasers now consider these as essential as a top or cushions. The most generally used apparatus on French cars is the S. E. V. This is built by a company formed in the early days of the war to carry on the small business left by Bosch. Its first task was the building of magnetos for French airplanes. Other electric apparatus found on continental cars are the Delco, Paris-Rhone, Westinghouse, and Bleriot. The two-unit system finds most favor, being certainly not less than 80 per cent of the whole. Few car manufacturers are building their own electric appliance, the exceptions being Fiat and De Dion Bouton.

Unit Construction

Unit construction of engine and gearbox predominates. There are few cars with engine and gearbox mounted on a subframe with a universal joint between the two. This method of manufacturing is adopted notably by Unic and Rochet-Schneider, also, among the newcomers by the six-cylinder Farman. Other new firms, with rare exceptions, adopt the bloc construction, while many old firms have come to it also. Both three and four-point suspension of engine is to be found. In some cases the two types are used by the same firm. Generally speaking, the small engines have three-point attachment and the big cars four-point attachment, tending to give stiffness to the frame. Lorraine Dietrich has the two methods, the firm's small six having three-point attachment and all the big sixes using the four-point method. Delage, Gnome & Rhone, Bellanger, Panhard-Levassor and Hispano-Suiza are among the high-class firms using four-point attachment.

In this connection, little use is being made of cylinders and upper portion of crankcase in one casting. It has been adopted by Clement-Bayard for one model. It is used on the Suere eight, by Renault and Clement-Bayard and it was tried by Fiat during the war but abandoned. All the others cast the cylinders separately and mount them on an aluminum basechamber fitted with an aluminum oil pan.

European manufacturers are going strong for the detachable head. It does not yet have a clear majority, but it has been adopted by some of the leading makers and there are indications that others will follow. In Italy it is used by the two most important firms, Fiat and Lancia, for all their models. Both these firms are in high-class production, so that it is evident the engineers are convinced that better efficiency may be obtained from the detachable head than from the fixed head.

Detachable Head

In France, the users of the detachable head, on some or all of their models, are Berliet, Clement-Bayard, Charron, Darracq, Delahaye, Lorraine Dietrich, Peugeot, Th. Schneider, Suere, Voisin, Bellanger and Chapuis-Dornier. Certain firms appear to be afraid of the objection being raised that valves cannot be withdrawn without taking off the head and, in consequence, have fitted valve caps in the detachable head. This is done on all the Delahaye models and also on the new Chapuis-Dornier engines built for car assemblers. With valve caps, the space available for water circulation is restricted and from an engineering standpoint this practice has nothing to recommend it. The statement has been made by the engineering department of one of these firms that this practice was forced on them by the selling organization, which refused to accept the detachable head unless there was the same facility for dismounting valves as on the fixed head. It would appear that this practice of fitting caps in the head is one that will disappear shortly.

On the new Bignan sporting type chassis, the valve caps are inside the water jacket, one big cap being used for a pair of valves. These caps are of large diameter and encroach somewhat on the cylinder head, so that when removed they give easy access to the combustion chamber and facilitate the removal of carbon.

The Elizalde, the only car of Spanish construction in the show, has a detachable bronze head, which is secured to the cylinder block by five studs only and without the use of a gasket. This is an overhead valve model with a camshaft in the base chamber and valve operation by enclosed pushrods and overhead rockers. The claim made for the bronze head is that it diminishes carbon deposit and reduces the possibility of pre-ignition.

The use of the vacuum feed is most extensive, being found on probably 75 per cent of the cars in the show. Gravity is used for a certain number of small low-priced cars but it is no longer found on any cars of medium size. There are few cases of pressure from the exhaust gases, and not many of pressure by means of an air pump. Fiat comes in this latter class, but the system here is special, for on the front face of the dashboard there is a reserve gasoline tank containing a float and needle valve, which is fed from the rear tank and supplies the carbureter by gravity. This does away with all necessity for a hand pump. The objection has been raised by some makers

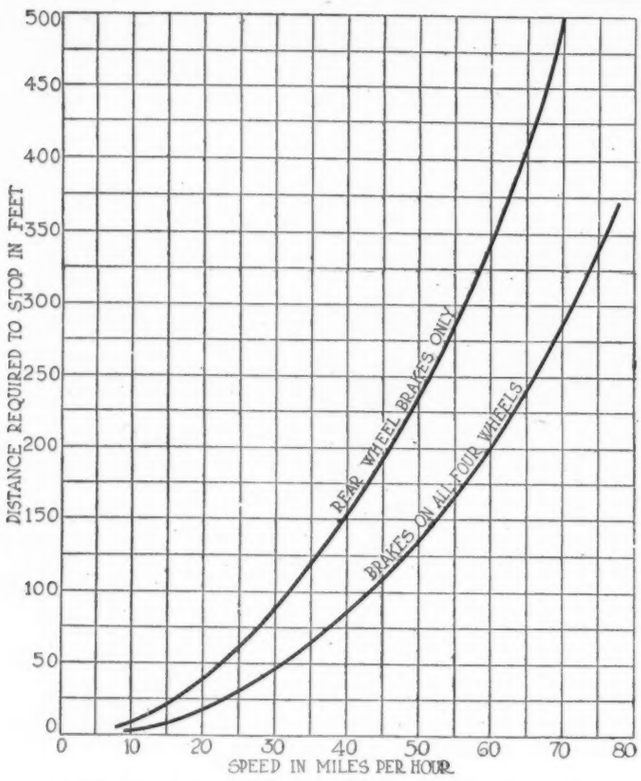


Chart showing brake and stoppage tests made by Mr. Bradley

that on a mountain road, where the throttle has to be kept wide open for a long time, the vacuum is not sufficient to keep the supply tank full. It is quite admitted that it is sufficient partly to close the throttle for a second in order to renew the supply of gas, but, because of this defect, Fiat, among others, has preferred to adopt the modified type of pressure feed.

Several makers have sought to get rid of the supply tank on the front face of the dashboard and, in consequence, have built it into the false dash, just ahead of the instrument board. This is done, notably, on the Peugeot models.

The leather face cone clutch has lost considerable ground. On the other hand, the multiple disk and the plate clutch have gained. On the small Suere, there is a steel cone clutch operating in a cast-iron female member. This latter has deep oil grooves through which the lubricant is driven out slowly, and progressive engagement is assured.

With the exception of one small Peugeot, which calls for a large gear reduction, there are no worm-driven rear axles on continental cars. The spiral bevel gear is the most popular type. The straight bevel is in a minority. The only other type is the herring-bone gear employed by Citroen, Mors, and Sizaire-Berwick.

There is a large increase in the use of banjo axles formed of two stampings welded together. During the war, the various factories have put in presses and now are in a position to do this class of work. Among those having adopted this rear axle construction are De Dion Bouton, Clement-Bayard, Darracq and Bellanger. Fiat has a pressed steel axle, as before the war, but welded instead of bolted. The Suere system of armored aluminum axle is interesting for light cars. It is composed of a steel tube split and opened at the center to give the necessary height for the differential and having an aluminum case around it.

The Hotchkiss drive has lost ground, partly owing to the adoption of cantilever suspension. The most important firm to abandon it is Hispano-Suiza, who now has central drive with an enclosed propeller shaft. Under this arrangement, the springs are shackled at both ends and take care of suspension only. The type of drive most frequently used is that coming under the general heading of "central drive," the propeller shaft being enclosed and its forward end forming a sphere that is received in a housing either on the rear face of the gear box or on a central cross chamber of the chassis. In this connection should be mentioned the Hispano-Suiza method in which the spherical housing is attached to the cross frame member by ball bearings on a horizontal axis, this taking care of all movements of the axle in a vertical plane, and the sphere being relied on for movements in all directions.

Brakes

Front wheel brakes are an important development. They are used at present by Delage, Hispano-Suiza, Piccard-Pictet, Excelsior, Isotta-Fraschini, Bellanger and Elizalde. Several other makers are known to have decided on their adoption, although not having made any public announcement on this point.

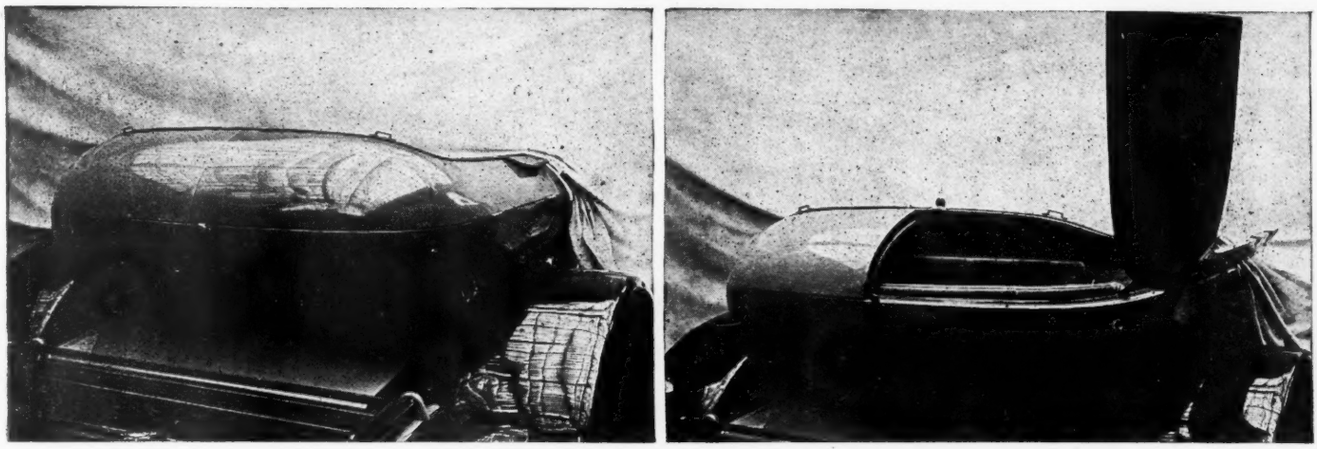
With the exception of Isotta-Fraschini, all the front wheel brakes are designed by Engineer Perrot and are used under his license. There is a certain feeling that front wheel brakes are liable to be dangerous if applied on corners and that, owing to uneven wear, they will give trouble by skidding. As laid out on the above mentioned cars, no such trouble is probable and, for turning corners, the car with front wheel brakes is infinitely superior to one with brakes on the rear wheels only.

The following tests were made by the writer on an Excelsior car a few months ago. Running down a 10 per cent grade at 40 m.p.h., the driver was ordered to make a right-angle turn when only 50 yds. away from the turning point. In that distance it was naturally impossible appreciably to slow the car, yet the right-angle turn from a main road into a narrow road was made without any difficulty. This was repeated on several occasions. Such an experiment on a car with the ordinary transmission or rear wheel brakes would have been fatal to both car and occupants.

Carrying out similar tests on a Delage car, the wheels were put over at three-quarter lock, while traveling at 30 m.p.h., the brakes were applied and at the same moment the steering wheel was abandoned. The car pulled up without any tendency to deviate from its course. This test was made under all kinds of road conditions, dry, wet and greasy, with satisfactory results. It was impossible to make the car skid by application of the brakes. On the fast run from Paris to Nice, 621 miles, in less than 16 hrs. total time, the six-cylinder Delage had its brakes adjusted once, the time occupied being 3 seconds.

This run, which was accomplished on an absolutely standard car with full touring equipment, could not have been performed in the time without the use of front wheel brakes. On one occasion, when a blind corner was discovered while going at 45 m.p.h., it was possible to make the turn in perfect safety. With any other system of braking, the driver would have certainly gone straight ahead into the fields as the easiest way out of a difficult situation, or if he had attempted the corner he undoubtedly would have overturned.

The speed with which a stop can be made on a car equipped with brakes on all four wheels is remarkable. With a car weighing 4,400 lb., it is possible, when running at 60 m.p.h., to pull up in 65 yds. With a car of equal weight running at the same speed it was impossible



A novel method of enclosing the top

to stop in less than 115 yds. These are average times taken under average road conditions. The six-cylinder Delage touring model, which has a maximum speed of 72 m.p.h., can always be stopped in 85 yds. In other words, if the driver has a margin of 100 yds., he can always stop, whatever the speed of the car, with a reasonable degree of safety.

Generally, when front wheel brakes are employed, there is no brake on the transmission. Delage, however, has kept his transmission brake, but the practical use of this, owing to the high efficiency of the wheel brakes, is to hold the car in a standing position. On this machine, the wheel brakes are operated by the foot. Hispano-Suiza has no transmission brake, but the rear wheel brakes can be operated by the foot in conjunction with those on the front wheels, or independently by lever. This arrangement has been made in order to have one set of brakes that will hold the car when it is in a standing position.

Apart from front wheel brakes, close attention has been given to the braking system in general. The transmission brake has lost ground with the adoption of unit construction of engine and gear box, which has decided engineers to place both sets of brakes on the rear wheels. With hardly an exception, these are of the internal expanding type with inside ribbed drums, the two sets being placed side by side. Some makers give a greater width to the foot brake than to the one operated by hand. Drum diameters are large, many of them running as high as 15 in., and, in a few heavy cars, the diameter goes as high as 20 in. Ferrodo, an asbestos fabric, has gained considerable ground as a brake liner.

Car Suspension

Car suspension has been given close attention, this having been forced on French manufacturers in particular by reason of the very rough road surfaces in France. The roads are so full of small holes that they inflict terrible punishment on a car when speed is attempted. On many of the roads of France at the present time the limiting factor in speed is not the engine but the springs.

The majority has sought improvement in the use of cantilever springs for the rear. One maker, Elizalde, also has cantilever springs in front in conjunction with semi-elliptics. All others use semi-elliptics only in front. Numerically semi-elliptics for the rear are about equal to cantilevers. Both length and width of springs have been increased. There is a tendency to fit shock absorbers, the Houdaille being very prominent on French cars, and there is also a rather considerable use of an inverted or damper leaf above the main leaf. At the present time the only user of the platform type of suspension is Delaunay-Belleville. Renault and Clement-Bayard have adopted transverse rear suspension for their low-priced models. The most original production in springing is the combination of cantilever and semi-elliptic found on the Lancia.

Low-Priced Cars

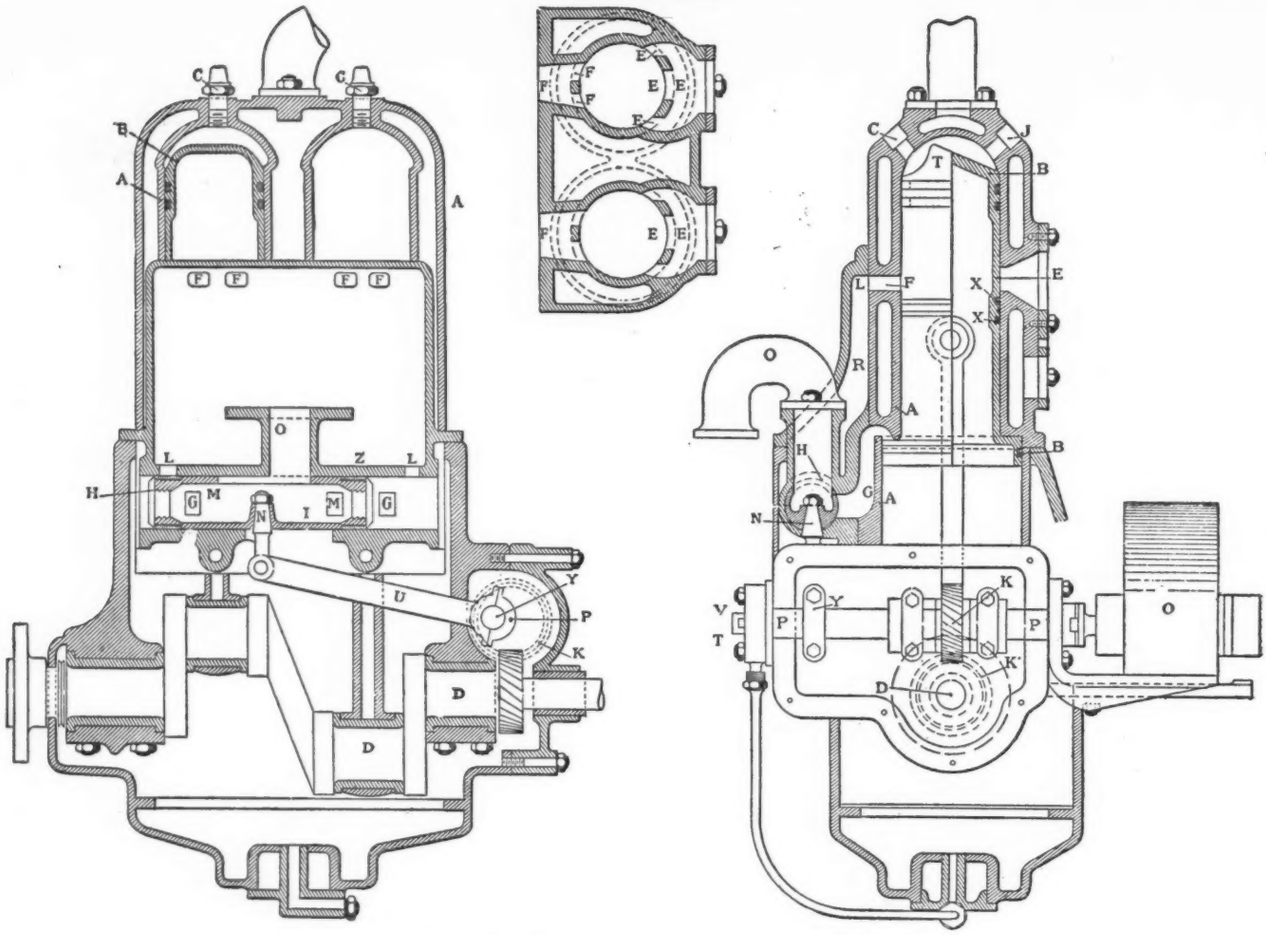
In the low-priced car class there are not as many developments as might have been expected. Citroen has gone ahead on his car without any changes and is now in production at 50 daily. This is a European type car with a small engine and light construction throughout, the accommodation really being only sufficient for four persons.

Renault has gone into production on a somewhat similar type of car which originally was announced to be sold complete at 8,800 francs, but is now being offered at 12,800 francs. This is a four-cylinder job of 3 x 4.8 in., having cylinders and the upper half of crankcase in one casting. The valves are not enclosed. In other respects, the engine follows the usual Renault practice. The same applies to cooling and to the clutch mechanism. The rear axle construction as well as the rear spring have a very great resemblance to the Ford. The four-speed gearbox is at the front end of the propeller shaft housing and is mounted in a sphere to a cross frame member. The car is equipped with electric lighting and starting, left-hand steering, with all the electrical instruments on the steering column, and with Michelin steel disk wheels.

Berliet has on exhibition the popular car first shown at the Lyons fair. Judging from European standards, it has a big engine of four cylinders, 3.6 x 5.2 in. Here again American practice has been closely followed and much American equipment, including lighting and starting units, are found on it.

Lorraine Dietrich is laying plans to get into lower-priced car production and has brought out a light six which, so far as the engine is concerned, has a certain resemblance to the Buick. A close examination, however, shows that it embodies much original work and many interesting features, endeavoring to keep weight down as low as possible and to simplify machining. While overhead valves with pushrods and exposed rockers have been adopted on account of cheapness, advantage has been taken of aviation experience, as is shown by the use of light tubular connecting rods, aluminum pistons, light pushrods and rockers, etc.

Clement-Bayard is also in the cheap car line with a four-cylinder, 3.4 x 4.6 in. engine having cylinders and



L. V. Thomas two-stroke valveless engine

A, working cylinder; A', pump cylinder; B, working piston; B', pump piston; C, spark plugs; D, crankshaft; E, exhaust port; F, transfer port between chamber R and cylinder A; G, communicating passage between pumps and cylinder H; H, horizontal distributer cylinder; I, distributer; J, scavenging valve; KK', helical gears; L, communicating passage between cylinder H and chamber R; M, communicating passage between passage G and pumps; N, distributer operating rod; O, central part of inlet manifold; P, transfer shaft; Q, magneto; R, compressed gas chamber; T, deflector; U, horizontal connecting rod; V, oil pump; X, piston rings; Y, eccentric; Z, distributer piston

crankcase in one casting, detachable head, Delco ignition, unit construction of engine and gearbox, pressed steel rear axle and transverse rear springs. The cheapest five-passenger is the A. S. S., which is equipped with a two-cylinder water-cooled engine built under Thomas license. This made its first appearance in an incomplete condition at the Lyons fair last spring, and is now shown complete for the first time.

Bellanger is announcing a low-priced car on American lines, the selling price in France being 18,500 francs. As Benjamin Briscoe assisted in the designing, it may be assumed that it is entirely on American lines. One machine was on exhibition at the show, but as the hood was tightly fastened down with wire, there was no opportunity of examining its mechanical features.

Prices are indefinite, it being impossible to say whether many makes will get into the cheap car line or will be just a little higher up in the medium car class. As a rule, makers are not advertising prices prominently, for it is felt that changes soon may have to be made. The removal of the present high import duty would undoubtedly tend to force prices downwards.

Peugeot is interested in the small, light-weight, cheap car with a fairly high finish. This has a four-cylinder engine of 2.6 x 4.14 in., with single casting of cylinders and crankcase, unit construction, cantilever springs, and electric lighting and starting. The Baby Peugeot two-seater has been dropped, but at the last moment the firm uncovered a small, light car with tandem seating. It was announced some months ago, then withdrawn, and finally was exhibited at the Peugeot showrooms, but not at the automobile show. The machine has four-cylinder engine of only 2 x 3.4 in., with three speeds and reverse and worm-driven rear axle. The track is only 36 in.

A New Form of Spark Plug Tester

A NEW device permitting of testing spark plugs under pressure has been developed by E. W. Morgan. In former devices of this kind, the sparking plug to be tested was screwed into the wall of a compression chamber, in which compression was pumped up by means of a tire pump or otherwise. This was subject to the objection that usually either the spark plug itself or its joint with the compression chamber leaked air and the pressure within the chamber would quickly drop.

In the new device the whole spark plug is placed inside a compression chamber of cylindrical form, the opening provided for entering the plug being closed by a removable cap, which is firmly held against the cylinder end by means of suitable yokes. Connection is made with the insulated spark plug terminal through an insulated connector passing through the cap. All fixed joints are made airtight and a heavy glass lens at the end opposite the cap permits a view of the interior.

Putting Quality First in Bearing Production

There are two kinds of production in the first division—quantity and quality. This article has to do with quality. The Marmon company sought to eliminate all possible troubles with the heavy crankshaft in their engine by aiming at perfection of the bearings. An unusually large casting was the first step. Then every step was made as complete as possible and special machinery devised to avoid mistakes. The story is told here

By J. Edward Schipper

TO support the unusually heavy and rigid crankshaft in the new Marmon cars, use is made of a bearing that calls for extraordinary methods of manufacture. The methods were worked out by the Marmon production heads, and that little regard was paid to cost is illustrated by the fact that the amount of metal in the rough castings is five times as large as that in the finished bearing.

The bearing to be discussed is the center main bearing supporting the three-bearing crankshaft. It is die-cast in a brazed iron shell, the cast iron being first brazed and the babbitt liners then die-cast into place.

The cast-iron blank for the bearing shell is designed with a large flange at one end as a chucking ring. Its sole purpose is to hold the iron bearing backing in the machine while the primary locating operations are being accomplished. This casting is chucked in a Potter & Johnson lathe, which, by the way, is one of the many machines secured from the United States Bureau of Aircraft Production. These machines were in the factory while the concern was working on the Liberty and Hall-Scott aircraft engines and many are being turned to good usage in connection with the manufacture of the new car.

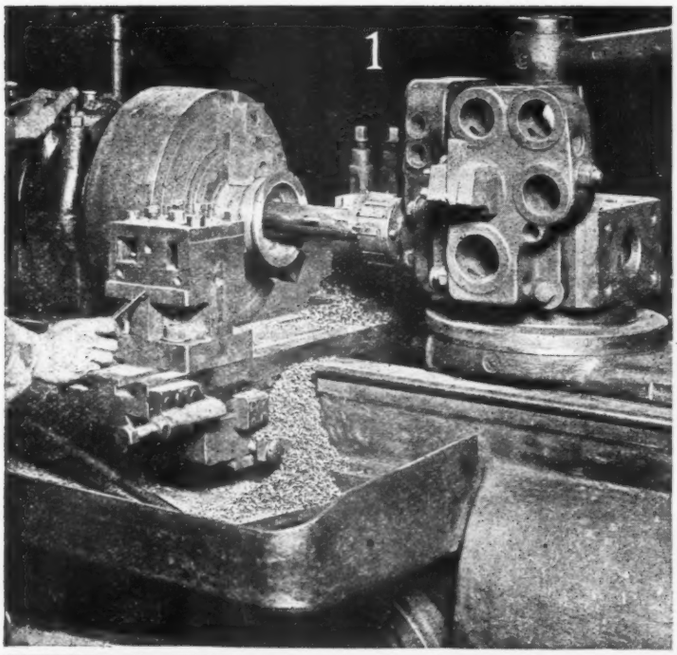
The first operation, Fig. 1, consists in turning the outside flange of the chucking ring. The blank is shown clearly in Fig. 2 with the results of this first operation. The end is also faced and the piece is counterbalanced, the limit on the counter-boring being 0.0001 in. The operation requires 4 min. The piece is then reversed and chucked by means of the chucking ring, which has previously been turned accurately as described. The bearing is bored, small end faced, counter-bored and the two flanges on the outside are turned. The operation is semi-automatic, requiring 4 min. and 15 sec., according to the time sheet. It puts a surface on the inside of the bearing, rendering it suitable to hold the brazing. Next the piece is sent over to the Prest-O-Lite Co., also located at Indianapolis, where the bearings are brazed to render them suitable for taking the babbitt, which is afterwards die-cast, in place.

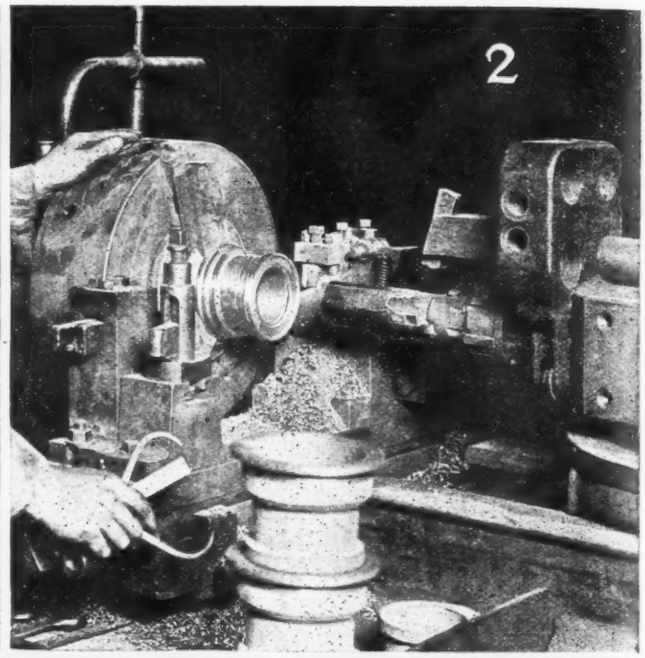
When the part returns from the Prest-O-Lite Co., the brazing material is in a lumpy condition and this must be smoothed down. The machine shown in Fig. 3 accomplishes this operation. It refaces and bores the brazed iron and turns the outside surface. These operations are completed on the semi-automatic shown in Fig. 3. The last of these operations is to cut off the chucking ring, which is no longer required. The turning operation leaves 0.025 in. of material for grinding. The job takes 13 min. on an American lathe.

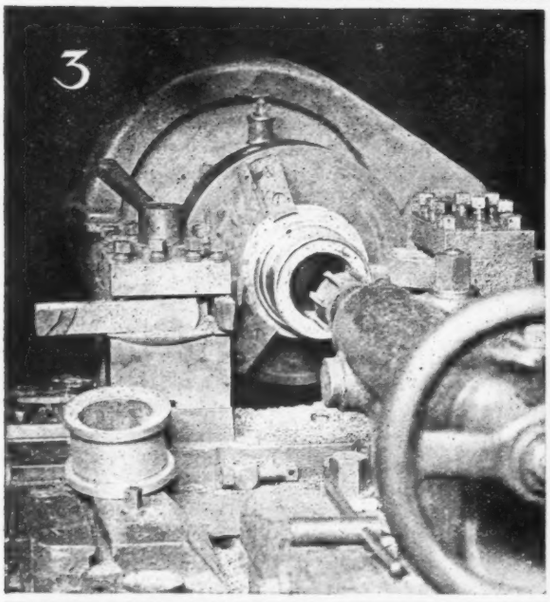
Babbitt Lining

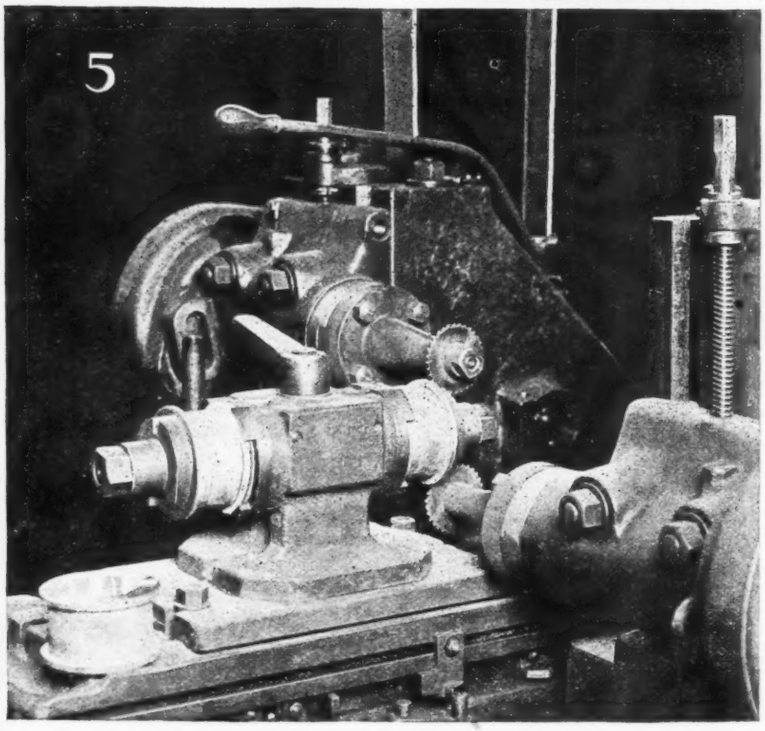
After the bearing is rough faced to length at the front end, it is sent to the American Die Casting Co. for its babbitt lining. Here the babbitt is cast in place on a mandrel, so that when it returns to the Marmon company it has been roughed to size throughout and the babitt is in place within. The first two operations on the return of the bearing are to face each end and chamfer. There are two machines required for this, the metal being faced and chamfered first on one end, then the bearing is reversed and the other end faced and chamfered, the second operation being particularly accurate in holding the bearing to the required length. These operations require respectively 1½ and 2 min. When they are completed the bearing is saw slotted to within 1/64 in. of through, in the machine shown in Fig. 5, the upper and lower slots being cut simultaneously by circular saws.

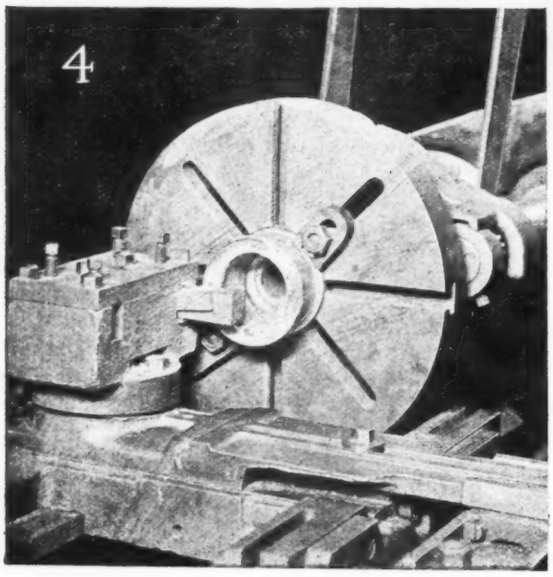
The saw cut is slightly off center so that the bearing is not cut in halves, but in two parts, one of which is slightly larger than the other. The larger part is the one to be finished, the smaller part being afterwards thrown away. Before going further in the machine manufacture of the bearing, a workman removes the burrs by hand. He is shown operating his hand-scraping tool in Fig. 6. This being completed, the babbitt is bored by means of a plain boring cutter, Fig. 7. This is a rough boring operation for the inside of the bearing and is a preliminary step in bringing the bearing to size. The object of sawing the bearing not entirely through is brought out in this operation, as it allows a circular cutter to be utilized in a way that would not be possible with a semi-circular cut which would tend to allow the tool to spring on leaving the work and to gouge in at the beginning of the cut. By maintaining the circular interior











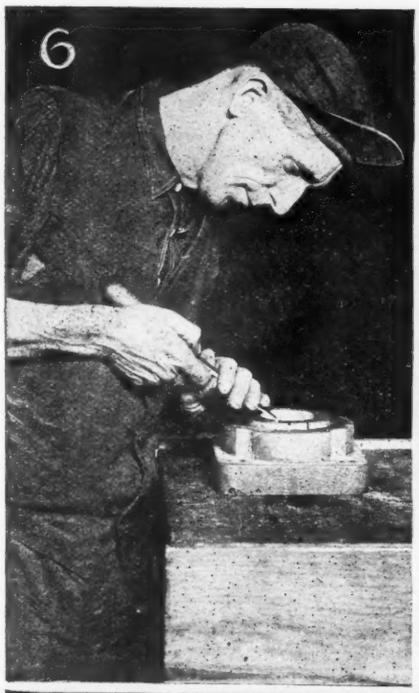
1—*Turning the chucking ring on the Marmon main bearing*

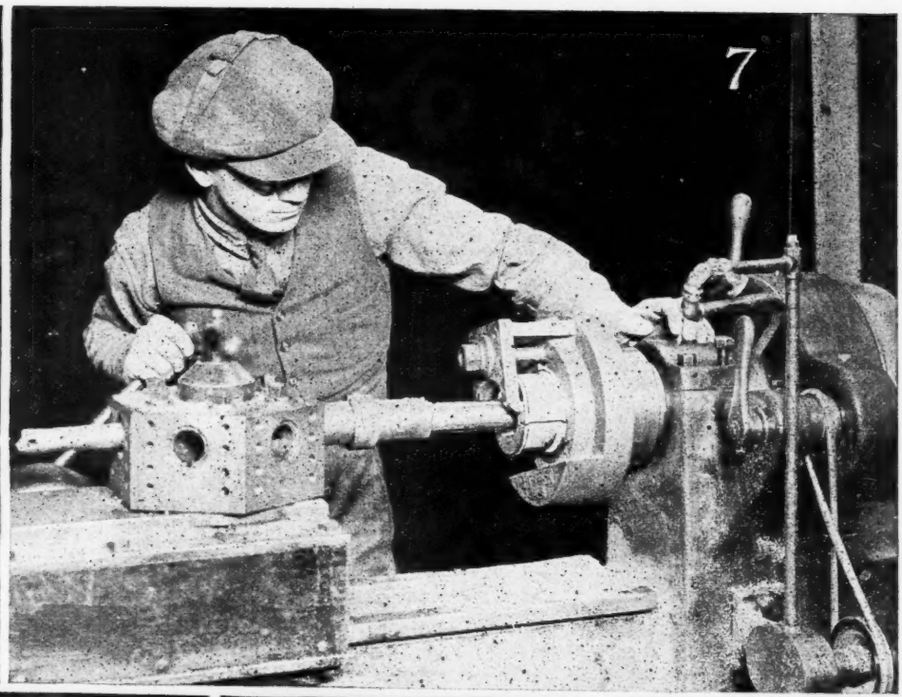
2—*Rough turning and boring the iron casting which forms the Marmon engine main bearing support*

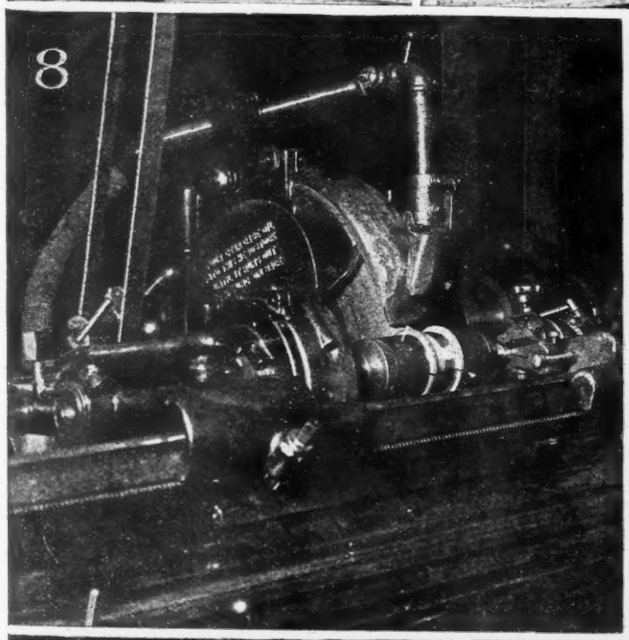
3—*Turning the outside diameter of the iron casting, reaming and cutting off the chucking ring*

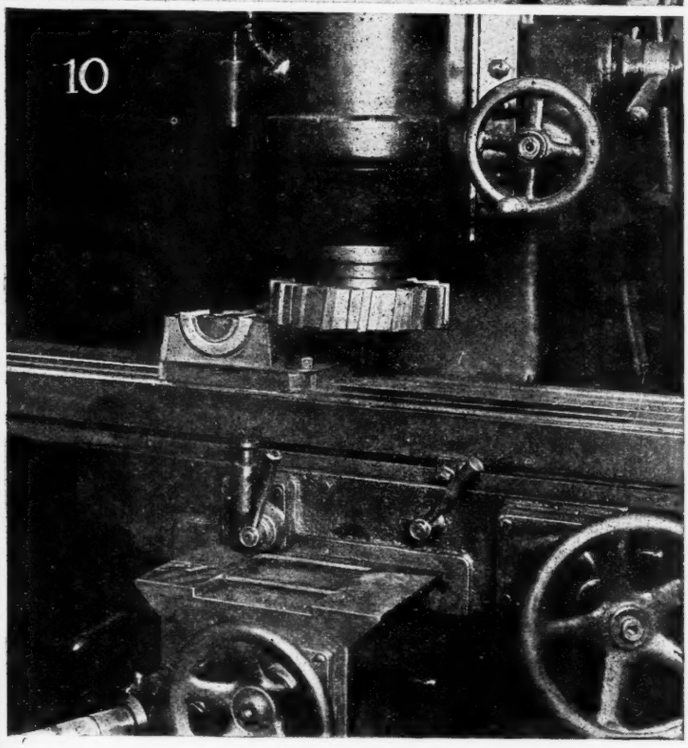
4—*Rough facing the cast iron bearing support to length*

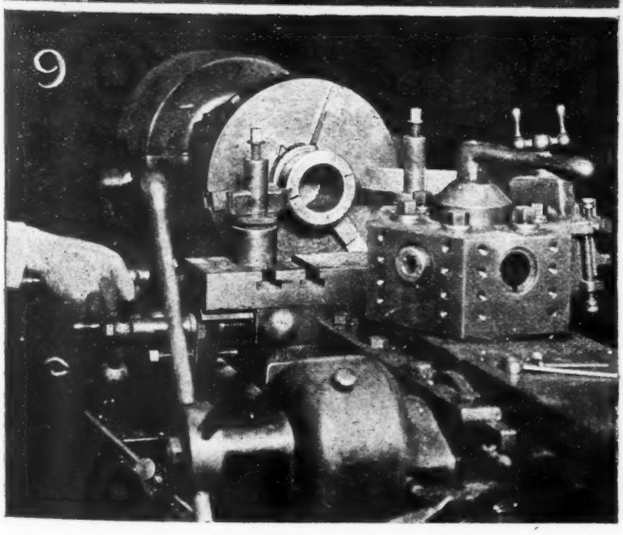
5—*Sawing the bearing almost in two. The bearing is sawed within 1/64 in. of through*











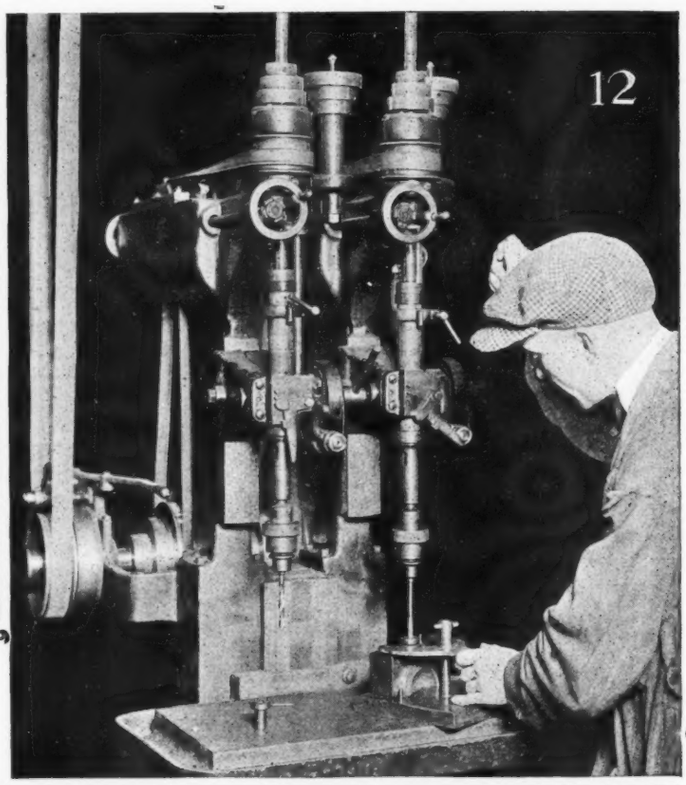
6—*Hand scraping to remove burrs on bearing*

7—*Rough boring the inside of the bearing*

8—*Grinding the outside diameter of bearing and inside of bearing back flanges*

9—*Facing bearing to length*

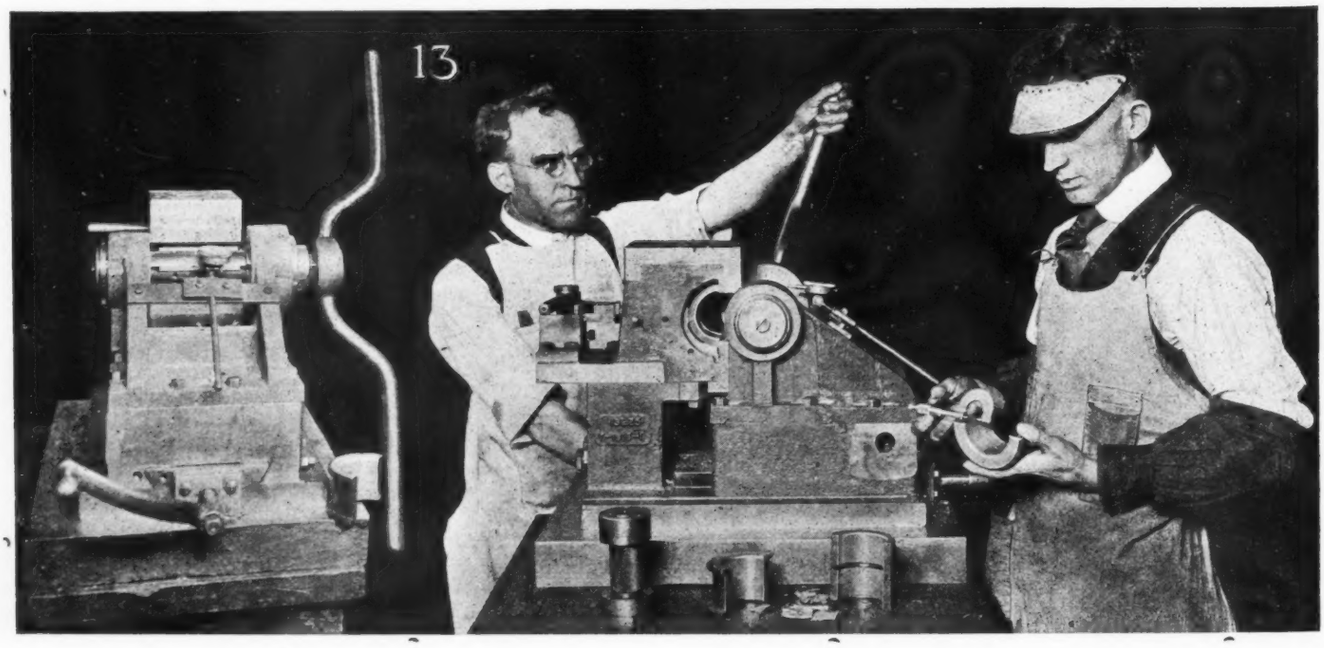
10—*Milling surface of half of bearing. The smaller part is thrown away when bearing is cut in two*



11—*Inspection for measuring outside diameter to bearing flange face. Note surface plates for checking squareness*

12—*Drilling dowel hole in bearing*

13—*Two views of the bearing and finishing tool*



surface the cutter is allowed a full uniform action without the objectionable springing.

The bored bearings are then ready to be surfaced on the outside and this is done by grinding. Fig. 8 shows the grinding operation on the outside diameter and also on the inside of the bearing flanges. This operation of grinding between the flanges puts the required finish on the outside and also holds accurate the distance between the two flanges. The grinding operation takes about 6 min. After being ground the bearings are rounded off both on the flanges and on the bearing bores.

The through cut is completed by hand, a hack-saw being found best for this purpose.

With the bearing located in a fixture accurately backing against the round outer diameter, the flange is milled square as shown in Fig. 10. This flange surface is then brought to absolute squareness by a surface scraping operation held to a limit of 0.0001 in. The time estimated is about 10 min. per bearing.

The surface scraping is illustrated very clearly in Fig. 11. This work probably will be done later in a filing jig. After the surface is spotted by means of Prussian blue on the surface plates and scraped, the measurements are taken on the dialed instruments to show the squareness of the face and the accuracy of the distance between the exterior of the bearings and the flange face. This is held extremely close, as accuracy in this direction is necessitated by the method of cutting the babbitt bearing sur-

face, which is described later. Following this hand scraping, the back of the bearing is drilled and reamed for the dowel pin. This work is done on an Avey single-spindle drill press, as shown in Fig. 12.

The final finishing of the bearing surface is done on a special tool designed in the Marmon tool room. A firm fixture is designed and accurately made to fit against the back of the entire bearing. By means of a cam lever, the bearing is pushed against a horizontally revolving reaming cutter, which is operated by hand. The operator turns the cutter until the dial on the instrument indicates that the proper amount of metal has been removed and the bearing surface is completed. The construction of this tool is of particular interest in that it permits of the highest degree of accuracy on the part of a semi-skilled workman.

The cam which moves the work toward the cutter is so designed that it cannot bring the work up too far, as it throws over center and consequently cannot push the bearing any closer to the cutter than the limit of the cam throw. The dial is easily read and magnifies the smallest dimension to such an extent that the operator can readily determine when he has removed enough metal. As a final check against the operation, a micrometer thickness reading is taken.

With the completion of this operation, the bearing is ready to go to the crankcase, and in order to maintain the same accuracy of fit in assembly as was carried throughout the manufacture, the bearing seat in the crankcase is cut with a diamond-pointed tool. These diamond-pointed tools, due to their great hardness, require infrequent settings and have been chosen by the Marmon company because of its experience in airplane engine manufacture. In making the Liberty engine, as many as 1,600 crankcases were cut without a single resetting of the tool.

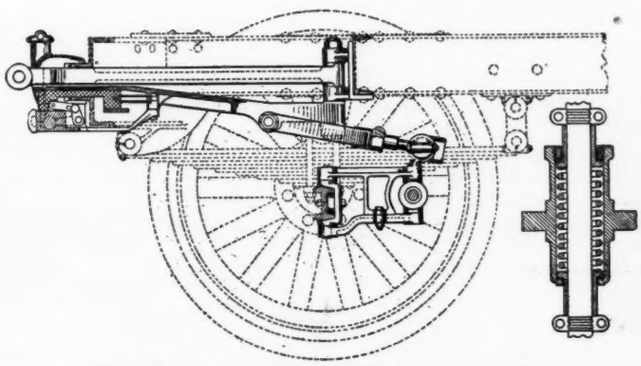
In studying this method of manufacturing main bearings, the sole idea from the start has been the attainment of accuracy. The fact that almost one-half of the metal which has been worked upon by the cutting tools and grinding machine is discarded after the bearing is cut in two, illustrates this point very clearly. It will be of interest to watch the results in practice of this method of bearing manufacture.

Motor Truck Trailers

FOUR wheel reversible, semi and pole trailers of 3 to 7 ton capacity will be manufactured by the Byron Engineering Works, a new organization. Special interest attaches to the design of the four wheel trailer, which has a steering device so arranged that the trailer tracks automatically with the front wheels of the truck or tractor that is pulling it. This steering arrangement is an entirely separate unit from the drawbar, and the operator may steer either end of the trailer by hand, independently of the position of the drawbar. This feature is said to entirely overcome the difficulties incident to backing and spotting a trailer, as it obviates the necessity of detaching the trailer from the truck.

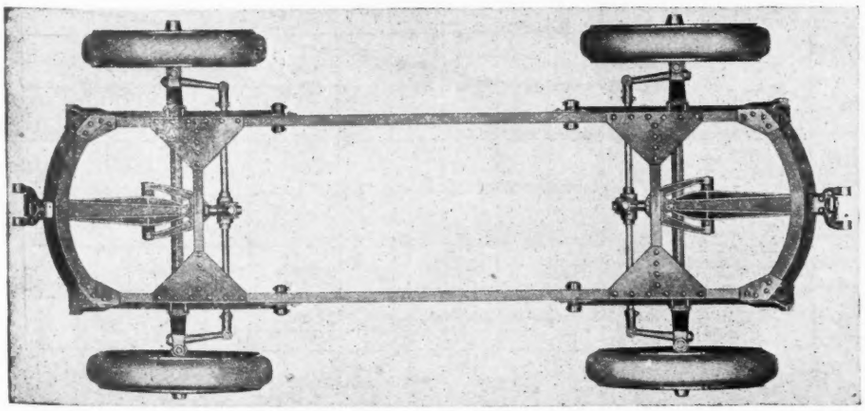
There is a spring connection between the steering arm and the axle reach rod, which acts as a shock absorber and relieves the steering parts from strain due to unusual road conditions.

The draw head of the four-wheel trailer is a high carbon steel drop forging. The connection between the drawbar and the drawhead is made with pins permanently fixed in the drawbar. It is impossible for the drawbar to become disconnected when it is raised into position for hooking it to a truck. The drawbar automatically locks itself in place and cannot be disconnected until its front end is lowered to within a few inches of the ground.



Drawbar and steering mechanism of trailer

A drop forged, heat treated pintle hook will be furnished with each trailer. The drawhead connection is very short and projects only a few inches beyond the body, thus enabling the trailer to be "spotted" close to a platform for loading and unloading from the end. The Byron trailer also has a trunnion on the drawhead for attaching the drawbar of another trailer without the use of a special connecting link in case two or three trailers are to be hauled in a train.



Plan view of four-wheel trailer

THE advantage of standard formula solder, which is composed of 50 parts lead and 50 parts tin, is that it has more fluidity than any other alloy used for soldering purposes. A strange fact concerning this alloy is that its melting temperature is lower than that of either of its components. Tin melts at 450 deg. F., and leads at 628 deg. F.; hence the melting temperature of an alloy of the two in equal proportion might be expected to be 540 deg. F., whereas the actual melting temperature is 398 deg. F.

The Possibilities of an Aeronautical Gas Turbine

In this thorough discussion of the report that German engineers have developed an aeronautical gasoline turbine engine, Professor Norman comes to the conclusion that such an engine is a possibility but that the advantages would not be of consequence. Silence, he thinks, would be the chief advantage. Generally speaking, the possibilities are for larger power than needed for aircraft

By C. A. Norman*

NOTICES have appeared in the daily press that the Germans have developed an aeronautical gasoline turbine. Further details, no doubt, will soon be available and guessing about them will not be necessary. Nevertheless, for better appreciation of the possibilities of such a machine, a short explanation of its underlying principles and characteristics may be in order.

The reports emphasize the fact that the turbine is silent. To those familiar with the gas turbine problem, this would appear to be the only certain advantage to be expected, with perhaps some advantage in weight. Greater simplicity and better fuel economy than those of the reciprocating engine are hardly to be looked for or even expected.

Gas turbines are either of the continuous combustion or of the explosion type. In the continuous combustion type, fuel and air are fed continuously under pressure into a combustion chamber. From this the gases issue

*Professor, Ohio State University.

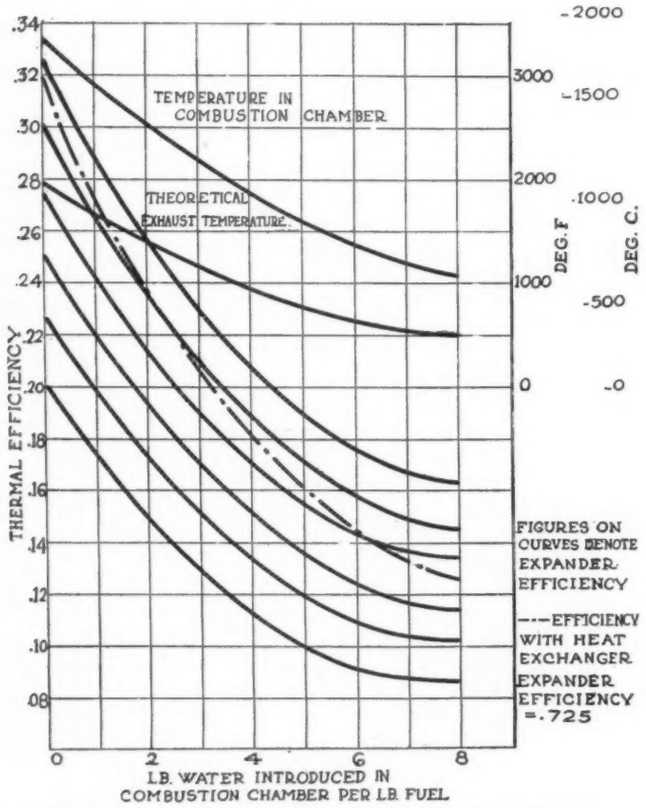


Fig. 1—Chart showing effect of injecting water in the combustion chamber upon energy utilization

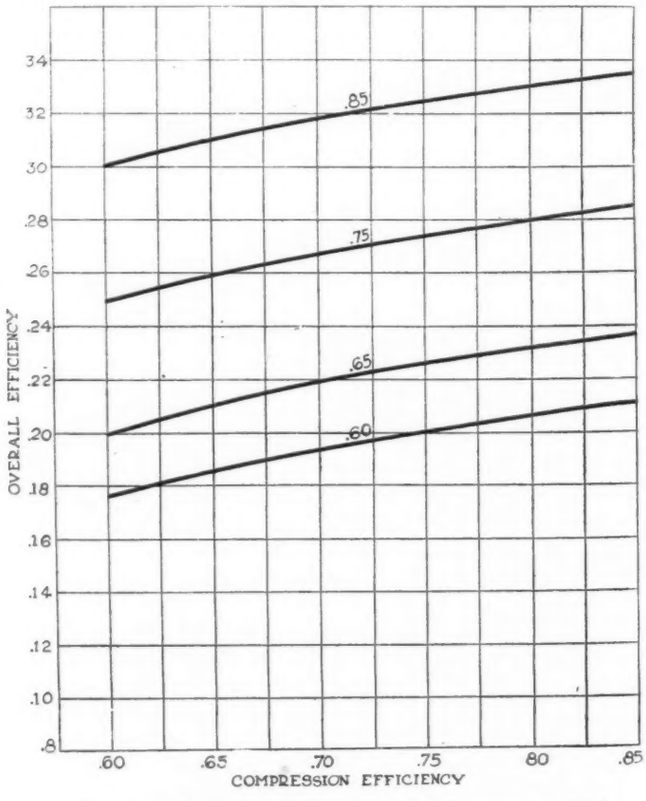


Fig. 2—Influence of compressor efficiency on overall efficiency. No water injection

through one or several nozzles and impinge on a turbine wheel.

The heat utilization obtainable by this sort of a device is shown by the curves in Fig. 1, reproduced from the writer's paper on "Working Processes of Internal Combustion Engines," read at the summer meeting of the Society of Automotive Engineers. As a basis for these curves, it has been assumed that the air can be compressed into the combustion chamber with an efficiency of 0.75 per cent isothermal. This means that the actual work is 33 per cent greater than the theoretical isothermal work between the pressure limits used and at an assumed temperature of about 70 to 80 deg. F. The assumed compression pressure is 150 lb. abs. This is about as high a pressure as can be efficiently produced with a one-stage compressor.

The efficiency assumed cannot be attained by a centrifugal compressor, especially not by one of comparatively small capacity. The pressure cannot be attained by any form of positive blowers. It is necessary to assume that some form of piston compressor is used. With large compressors running at low speed, a higher efficiency may be attained; but for automotive purposes we have to assume a compressor of small dimensions running at high speed.

In order, now, to arrive at the thermal efficiency and fuel economy of the turbine, it is necessary to assume an expansion efficiency.

A fundamental law of all heat engines using compression by machinery is that a high working temperature is necessary for good fuel economy. Only so can the compression work be kept at a small percentage of the expansion work.

If high temperatures are used, however, it has (as far as I know) not been found possible to devise a "multistage" turbine able to handle them. A single turbine wheel revolving between water-cooled walls, or cooled by air blown through part of the blading, has been regarded as the only solution. Some statements have appeared regarding a non-metallic turbine wheel needing no cooling at all—but also having no blading. In any case, the kind of wheel used is not likely to turn more than 60 per cent of the theoretical jet energy into work.

With this expander efficiency the curves show a thermal efficiency of the turbine amounting to 20 per cent. This is a gasoline consumption of around 0.65 lb. per hp.-h., a much higher consumption than that attained by a good reciprocating aeronautical gas engine. To achieve

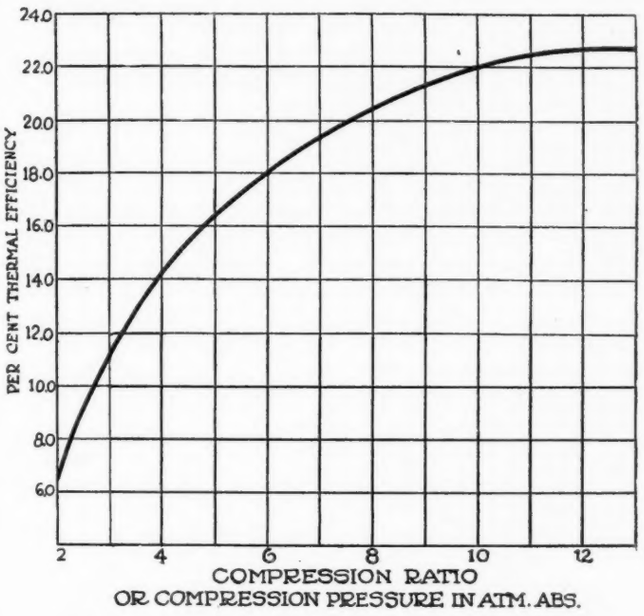


Fig. 3—Continuous combustion motors thermal efficiency in dependence on compression

Compressor efficiency = .75
Expandor efficiency = .70

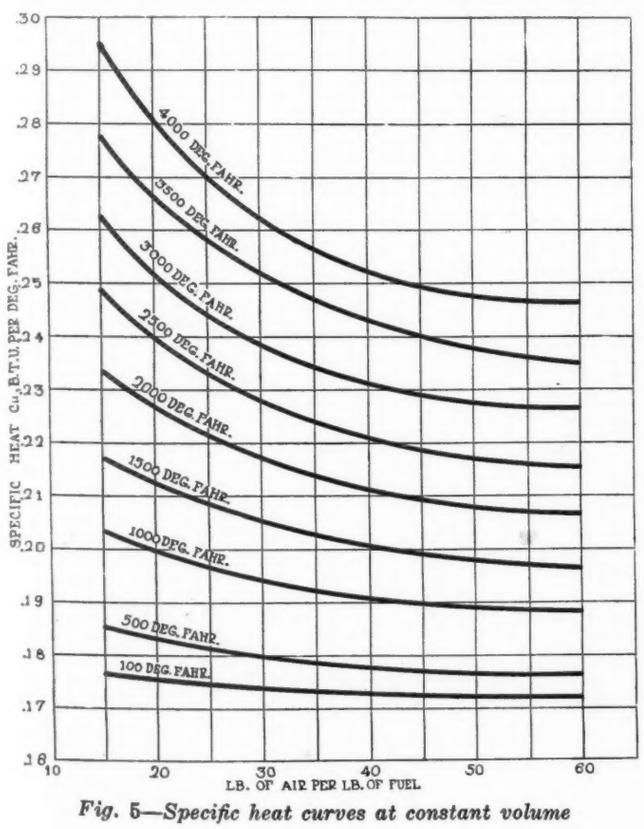


Fig. 5—Specific heat curves at constant volume

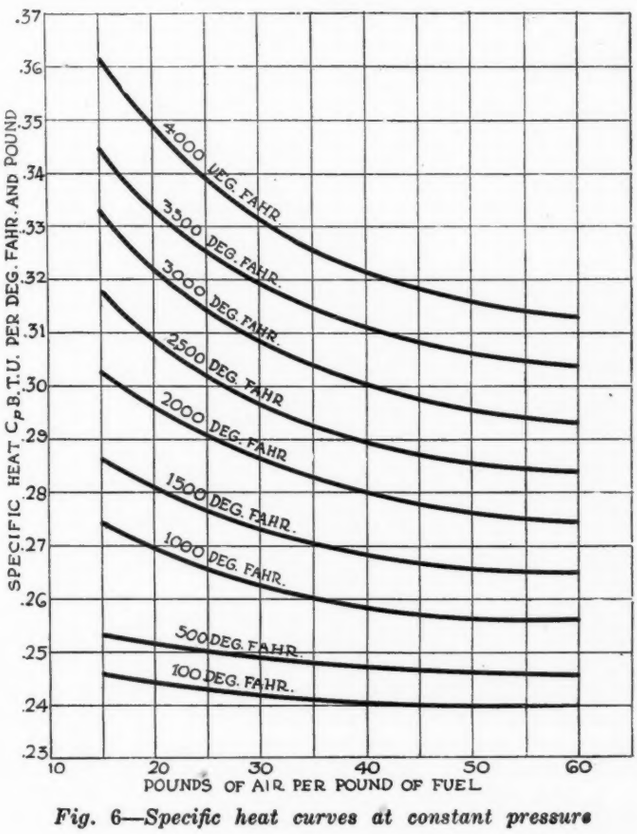


Fig. 6—Specific heat curves at constant pressure

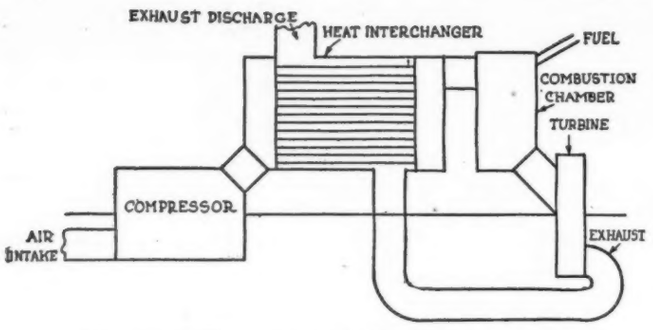


Fig. 4—Utilizing a heat interchanger in a gas turbine

it, we have none the less had to assume a piston compressor operating in conjunction with a turbine expander. Such a combination is, of course, not the ideal of simplicity. It has, nevertheless, some real advantages.

1. The pistons furnish working fluid at every stroke. The turbine is capable of giving a very great deal of power. The combination may very well show a great deal of power per unit weight.
2. The reciprocating parts work at comparatively low temperature and are entirely free from the lubrication, carbonization and other troubles of a combustion cylinder.
3. Fuel is injected continuously, thus both the carbureter troubles of carburetion engines and injection troubles of intermittent injection engines are avoided. The fuel need not be of high quality.
4. Ignition is by simple contact with the hot refractory lined walls of the combustion chamber. A spark plug may be needed for starting. Yet, during running no ignition troubles need be feared.

To offset these mechanical advantages some difficulties in cooling the nozzles, and especially the blading, of the turbine, must be looked for; likewise in obtaining satisfactory wall material or wall arrangement for the combustion chamber.

Finally the turbine part, for least weight and high efficiency, should revolve at speeds of 3,000 to 4,000 r.p.m. One of the main reasons for this, aside from the necessity of absorbing the jet velocity by the moving buckets, is to keep down windage loss by reduction in diameter.

The reciprocating compressor could hardly be run at half this speed and would therefore have to be driven through gearing.

In Figs. 2 and 3 are given some curves designed to show in a general way what increase in thermal efficiency may be expected from variations in compressor and expander efficiency, as well as compression ratio. The powerful influence of expander efficiency will be noticed. Unfortunately, not much improvement in this respect over the figure 0.60 assumed is to be looked for in an automotive turbine. It will hardly pay to increase compression very much. Even with unimpaired turbine efficiency the gain is not great. As a matter of fact, the higher the compression the less the turbine wheel will be able to absorb the tremendous jet velocities (4,000-5,000 ft. per second) resulting; the lower will be its efficiency.

In the writer's paper on "Working Processes" the possibility was referred to of heating the compressed air partly by means of the exhaust instead of by combustion directly. The arrangement is shown in Fig. 4. It is doubtful whether such a bulky contrivance could be admitted in connection with an automotive engine. If it can, then the heat utilization might thereby be increased to 25 per cent; the fuel consumption reduced to about 0.5 lb. p. hp.-hr. In other words, with this arrangement the turbine would be as economical as an average aeronautical engine.

The upshot of this review seems to be that silence is the only advantage immediately to be expected from a continuous combustion turbine. Increased reliability may possibly be hoped for. A possibility is the handling of very large powers, although for aeronautical uses the limitation of the propeller may render this possibility practically of little value.

In this type of turbine a series of explosion chambers are charged with a carburetted mixture, and explosions induced by timed ignition in these chambers in alternation.

The charging of the chambers must be carried out by outside machinery—a compressor, an exhauster, or a blower. For stationary plants it has been proposed to drive these charging machines by a steam plant running on the turbine exhaust. For automotive uses such an arrangement is hardly conceivable. An explosion turbine, with its valve and ignition mechanisms even apart from the compressor, is certainly not a simple machine. It would, therefore, be highly desirable to run it in conjunction with a simple type of centrifugal or positive blower for charging.

We shall analyze the working process of such a machine. Suppose that the charge is simply blown in at a pressure only slightly in excess of atmospheric, say 15 lb. per sq. in. abs. Let the temperature of the charge before entering be 60 deg. F.

The likelihood is that it will be heated up on entering the hot explosion chamber at least 100 to 150 deg. F.

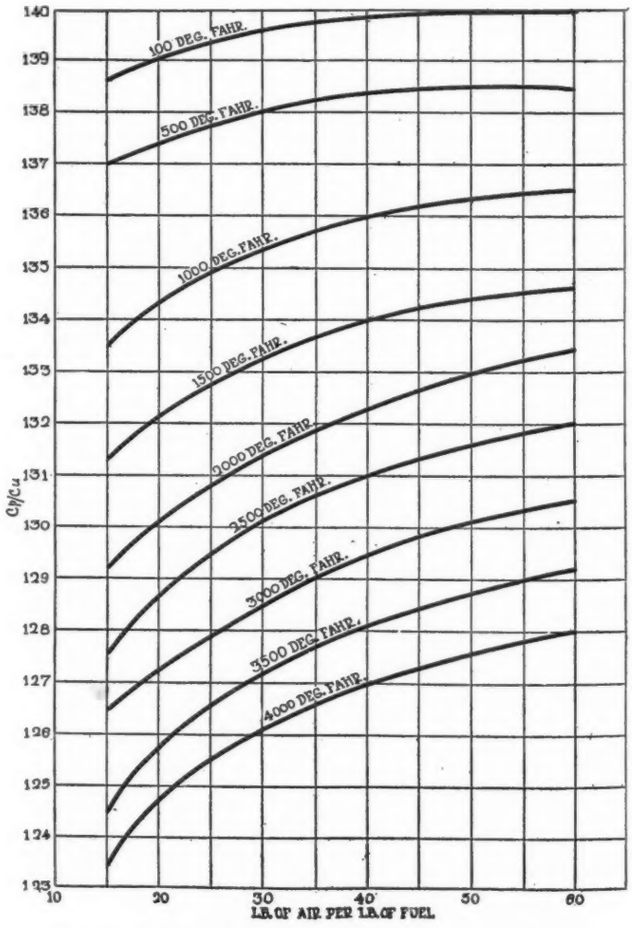


Fig. 7—Curves of Cp/Cv values for various amounts of air

Say that the temperature before explosion will be 660 deg. F. abs. = 200 deg. F.

To estimate the explosion pressure we may use the specific heat and Cp/Cv curves given in the writer's paper on "Working Processes" and reproduced in Figs. 5, 6 and 7.

Assuming 15 lb. of air per lb. of fuel, the average specific heat at constant volume is about 0.23. The lower heating value of the fuel may be assumed to be 18500 B.T.U. per pound of fuel, or 18500/16 — 1155 B.T.U. per pound of mixture. Assume 10 per cent of this to be radiated to the walls during combustion, 10 per cent to be delayed, so that during explosion proper 1155 — 231 = 924 B.T.U. are added to the mixture. Then the maximum temperature reached is

$$\frac{924}{0.23} + 200 = 4200 \text{ deg. F.} = 4660 \text{ deg. F. abs.}$$

The corresponding pressure is

$$\frac{4660 \times 15}{660} = 106 \text{ lbs. abs.}$$

It may be surprising to some that no allowance is made for dissociation. As a matter of fact, dissociation plays very little part in our ordinary combustion processes. Water vapor is not dissociated to any practically appreciable extent below 4500 deg. F.

Carbon dioxide is at that temperature dissociated to the extent of 8 to 20 per cent, but it recombines rapidly as the temperature is lowered to 3500 deg. C. Temperatures high enough to melt platinum wires have been realized in explosion vessels.

Of course, if carbon is present in excess, then CO_2 is transformed to CO, just as hydrogen is set free if water vapor is passed over red-hot iron. At explosion a valve is opened and the mixture expands through a turbine nozzle onto a turbine wheel. Suppose that the 10 per cent heat not developed during combustion is enough by afterburning to maintain the pressure-volume conditions of adiabatic expansion during the expansion process. The expansion ratio is about 106/15 = 7.0. The average exponent Cp/Cv = 1.25. According to the curves in Fig. 8 this means a temperature drop ratio of 1.48, giving an end temperature after expansion of 3150 deg. F. abs. — 2690 deg. F. The heat per pound of mixture converted into jet energy is then

$$4660 - 2150 \times 0.28 = 424 \text{ B.T.U.}$$

To this expansion energy we should theoretically add the work furnished by the next entering charge in pushing out the combustion gas remaining in the chamber. The velocity, however, with which this remnant issues will be so small, compared with that for which the turbine speed must be calculated, that it will interfere with the working of the wheel rather than aid it. We shall therefore neglect this work entirely.

The efficiency of an impulse turbine wheel working under a variable pressure is low. Nevertheless the experiments of Holzwarth in Germany seem to indicate that 55 per cent may be looked for under favorable circumstances.

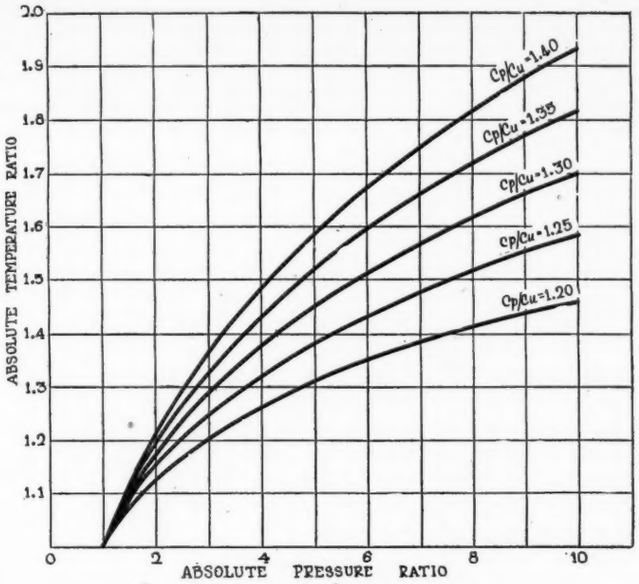


Fig. 8—Temperature drops for various expansion coefficients

We have then as net work per pound of charge

$$0.55 \times 424 = 233 \text{ B.T.U.}$$

Our thermal efficiency will be equal to this divided by the heat added to the charge per pound, or

$$233/1155 = 20.2 \text{ per cent.}$$

The work of driving the blower or exhauster may reduce this figure about 1 per cent.

It would then seem not entirely beyond the realm of reason to expect an explosion turbine running on something like 0.7 lb. gasoline per horse power hour, even with no compression of the charge whatsoever.

This is the type of turbine developed for stationary purposes by the German Holzwarth. A cross-section of the same is shown in the author's paper on "Working Processes."

A much better economy can hardly be expected with increased compression, since this means reduced efficiency of the turbine wheel, also added work lost in delivering the charge in the turbine chambers. Since these losses can be determined with any degree of accuracy only by experiment, a calculation of the thermal efficiency with increased compression will here not be undertaken.

Enough has been done to show that an explosion turbine for aeronautical uses is not an impossibility. The writer is not of the opinion that such a turbine, in comparison with the reciprocating engine, would mean a great reduction in weight, nor a great increase in reliability. It would be less noisy, however.

Impurities in Storage Cells

SOME recent researches on impurities in storage cells are described in an article in L'Elletrotemica which show that great damage may result from the co-existence of impurities in the electrolyte of lead storage cells that would have no appreciable effect separately.

A particularly remarkable instance is the result of the joint action of lead and tungsten. Each of these materials alone has no effect on the action of the cell after 20 charges and discharges, but when both are present marked effects are produced after only two discharges if the electrolyte contains traces of copper.

An intense action is produced by adding to the electrolyte a small quantity of the precipitate formed by treating sodic tungstate with copper sulphate. The efficiency of the cell immediately falls in consequence from 90 per cent to 15 per cent. The negative plates are attacked to the greatest extent, and the phenomenon is probably due to the deposition of lower oxides of tungsten.

Pneumatic Tire and Wheel Equipment for Motor Trucks

In this discussion of the probable change coming in motor truck equipment, Mr. Hale says that he expects truck designers "are going to try and save pounds, just as airplane designers try to save ounces on the airplanes." To appreciate just how far-reaching such an influence will be, will require a second thought. Naturally, Mr. Hale, being a tire man, goes extensively into the subject of tires and wheels

By J. E. Hale*

THERE are a few clear-cut points on this subject from the tire manufacturers' point of view which ought to be presented in such a way as to serve as good, fundamental information of a more or less technical sort, to guide the wheel makers in their efforts to meet the situation.

The change from solids to pneumatics as tire equipment on motor trucks makes such remarkable improvements in truck operation from many points of view that it really is an epoch-marking transition in motor vehicle development. The improved cushioning qualities which save the mechanism of the truck and conserve the health of the driver, the increased traction of the driving wheels, the greater speed of operation, and the much greater all-round usefulness due to all these causes, put the motor truck on an entirely different plane.

Fortunately there is nothing inherent in these pneumatic tires for motor trucks which makes their adoption difficult to handle, now that preliminary demonstrations of their possibilities have been carried out. The tires in a general way are typical of those in use on passenger car sizes. From the tire designer's point of view the structure of the tire does require some refinements and special treatments which are slightly different from the passenger car sizes, but these differences are not apparent to outside interests. In general the tires are subject to shortcomings very similar to those in our tires of passenger car sizes, regarding the matter of tire failure. Of course, the inflation pressure under which they are operated is greater, and I want to emphasize this point—that the tires being rather expensive and used in commercial work, the owner is under the necessity of seeing that they have the best possible treatment to assure their giving a low tire-mile cost.

The use of pneumatic tires on motor trucks has brought very forcibly to the front a problem which has wide ramifications affecting the tire manufacturer, the motor truck manufacturer, and the user. I refer to the problem of fitting the proper size to the trucks. It is especially important that these tires are not overloaded, lest they give unsatisfactory service, and because of the tendency in the past of automobile manufacturers to adopt pneumatic tire sizes for their passenger cars which were nowhere near adequate, we have been under the necessity of taking great pains to protect this new development in pneumatic truck tires.

Fortunately we have been very successful up to the present time, and, moreover, things are shaping themselves so that we believe that there will be co-operation among tire manufacturers and others interested to the extent that there will be a practical unanimity of opinion in recommendations as to the proper equipment. At the present time there are pretty good indications to the effect that we could have a standardized table of motor trucks by sizes and tire equipment, the idea being to recognize motor trucks by their carrying capacity and to specify the tire equipment which is adequate.

This matter is already under the advisement of the Standards Committee of the Society of Automotive Engineers and such a table has been under discussion at some of the meetings. However, it was felt that the table was not quite perfect enough to publish. I mention this because, in my opinion, it is going to mean a good deal to the wheel makers to work toward the standardization of wheels for the different models, if possible, just as truly as it is of advantage to the tire manufacturers to have simplified standards of equipment in use.

Unequal Front and Rear Equipment

Going now a little bit into detail on the matter of choice of tire equipment, I think it might be instructive to discuss a few sizes. First, I shall point out one complication we have in pneumatic equipment for motor trucks that does not appear in passenger cars; that is, the use of different sized tires front and rear. This is something that the public is not used to, and at the present time has resulted in some resistance along certain lines. Because of this condition we have to be very careful to decide on the proper equipment for the rear of the truck, which, of course, always carries the heaviest load. If we can induce the manufacturer to put on proper equipment on the rear, we found by practice that the front will take care of itself.

There is a tendency to want to put the same equipment on both front and rear, and the reason, of course, is to facilitate tire changes. In the case of the ¾-ton truck, 5-in. tires are adequate equipment for the rear and 4-in.

Chief tire designer Goodyear Tire & Rubber Co. Paper read before the Automotive Metal Wheel Association.

size will be adequate for the front. However, if they were to have the same size front and rear, the front should be the same as the rear, namely, 5-in. In the case of the 1-ton job, 6-in. is good equipment for the rear and 4½-in. for the front. Now in this case if they were to put 6-in. on the front there is possibly some doubt whether it would be a satisfactory job. In any event, the 6-in. equipment for the rear should not be cut down. Assuming that 6-in. on the rear would use a 4½-in. on the front, the 6-in. is truly a truck size and the 4½-in. is a passenger car size.

The 1½-ton truck should have 7-in. on the rear and 4½-in. on the front, which gives us a truck size on the rear and a passenger car size on the front so far as rim equipment is concerned. A 2-ton job should have an 8-in. on the rear and either a 5-in. or 6-in. on the front. In these cases where passenger car sizes are used on front and truck sizes on the rear, some real constructive work must be done by the wheel makers to make them match up.

The development of pneumatics for motor trucks seems to be fairly well worked out on equipment for trucks up to and including a 2-ton job. Beyond that the proposition is still unsettled, although partially developed. As I indicated in my opening remarks, pneumatic tire equipment opens up many aspects in the favorable development of motor trucks. One of the most prominent is the elimination of the destructive effect of bad roads to the truck mechanism. The direct result of this to the truck designer is that it makes it possible for him to design his chassis very much lighter.

As a matter of fact, the big result is manifesting itself in the elimination of hundreds of pounds of metal taken from all parts of the truck. In my opinion motor truck designers are going to try to save pounds on motor truck design just as airplane designers try to save ounces on the airplanes. I cannot over-emphasize what, in my opinion, is an extremely important point, namely, the elimination of weight from all parts of the motor truck, which is made possible by the pneumatic truck tire. They found it possible to cut weight out of the frame, the running gear, the axles, the body, in the power plant and its transmission mechanism, lightening up all around. In mentioning specifically the wheels, it is my opinion that the wheels can be made much lighter than anybody has ever dreamed of making them before and still have adequate strength, because the shocks and stresses are cushioned in such a pronounced way that the light-weight skeleton wheels are able to stand them. These light-weight wheels in turn mean taking dead, unsprung weight off the tires, which, of course, is extremely valuable.

All these remarks on the wonderful elimination of weight are simply bringing me up to the point where I want to predict that we will be able to use 9-in. tires (which fit 8-in. wheels) on 3 and 3½-ton trucks in the rear, and 10-in. tires on the rear of 5-ton trucks. This is really a very satisfactory showing, considering that up to the present time our development work has been conducted with 10-in. tires on the rear of the 3½-ton truck and 12-in. tires on the rear of the 5-ton job. This is not conclusive, however, but if the elimination of weight is as pronounced as it promises to be, there is no question but what it will probably work out that way.

Then we have the very prominent controversy of demountable vs. detachable equipment. I will state frankly that personally I am an advocate of detachable equipment in the larger size trucks, and I believe it is a question of the survival of the fittest, just which way the thing will go. My belief is based on what appears to me to be nothing more than sound economic principles, namely, that it is useless to carry around superfluous weight and that the public is not going to pay extra costs.

There are three ways of looking at this subject: First, the size of trucks under consideration; second, from the point of view of the commercial tendencies existing; third, from the point of view of good, cold-blooded logic.

Another way to size up the situation is to consider, first, the frequency with which tire changes have to be handled; second, the ease and facility with which changes can be handled on the quick detachable as compared with demountable equipment; third, the weight which has to be handled in changing and the weight which has to be carried as dead weight on the car; and fourth, the original cost of the various equipments.

The Demand for Demountable Equipment

I believe the demand for demountable equipment results largely from the fact that demountables are so largely used on passenger cars. On the smaller models which are at the transition point from touring cars there is probably more justification for demountable rims than in the larger models. The use of demountable equipment on ¾ and 1-ton jobs has been widely extended for a long time past, so that the public really expects this sort of equipment. There is no question but that it would be pretty hard to introduce any other under existing circumstances. Furthermore, the influence of this equipment is also felt on the 1½ and 2-ton models, so that the demand here seems to be for demountable equipment.

Whatever public opinion may be, I am decided that an attempt should be made to size up the problem from a cold-blooded logical point of view and try to guide public opinion along the proper lines, if we can decide what these are. The logical situation seems to me to indicate the following:

First preference, the steel wheel with detachable equipment in connection with a power pump; second preference, the demountable rim on the wood wheel; third preference, the detachable rim on the wood wheel.

We place the steel wheel first for several reasons. It is easy to seat the valve stem on a steel wheel. The thin felloe makes the valve easy to locate and pull through. Furthermore, the felloe can be slotted in such a way as to facilitate the insertion of the valve stem without seriously decreasing the wheel strength. Inflation of the tire is easier because there is more room between the spokes, giving easy access to the valves. The rim being integral with the wheel, it cannot come loose or get out of line, thus assuring normal wear to the tires. The steel wheel used in connection with power pump means the maximum of simplicity, lightness and strength.

Pneumatic truck tires are very sturdy and with proper care run for long periods of time without any trouble. The carrying of a spare tire fully inflated on a spare rim to take care of emergencies is an expensive piece of insurance because of the fact that the combination is heavy both to handle in changing and is out-and-out dead weight on the truck. Whether a truck has demountable or quick detachable equipment, the truck really ought to have a power pump for inflating the tire. Then, if it is decided to carry a spare, there will be much less weight to carry with a deflated tire. The difficulty in changing on a quick detachable rim is really not much more formidable than changing a demountable rim. As a matter of fact, it is easier work, but it takes a little longer time.

The matter is further complicated by the fact that most trucks will have to have different equipment on front and rear wheels, so if the spare tire idea is carried out 100 per cent, only two complete spares will be necessary.

I am absolutely convinced that it is possible to design a detachable wheel that would weigh much less than any demountable combination. In fact, on a 3-ton truck I believe that a saving of something like 200 or 300 lb.

can be effected by choosing the detachable. This means a saving in weight carried and also in original cost.

So much for detachable steel wheels. Now, to pass on to our second preference, the demountable rim can be used whenever there is a demand for all tire sizes up to the 42 x 9. In this case the wheel proper may be of wood with a steel felloe band, or it may be of unit design of metal; that is, with the bevels finished directly on the face of the metal wheel.

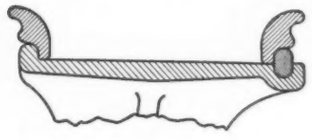
Our third preference of the detachable rim on wood wheels is very undesirable because the thick wood felloe makes it difficult to insert the valve stem in the valve hole by anybody except an expert. All drivers are not experts and many seem to be experiencing considerable trouble with this sort of equipment. Although this equipment is cheap, light and simple, this one disadvantage offsets its many advantages, and we do not recommend the detachable equipment except for use in connection with steel wheels. The demountable rim on wood wheels is very satisfactory equipment up to and including the 40 x 8 size. When you reach the 42 x 9 and 44 x 10 size, the weight to be lifted in the first instance of approximately 275 lb. and in the second instance of nearly 400 lb. makes the demountable equipment quite impracticable. We are recommending steel wheels with detachable rim equipment in connection with power pumps for use on all trucks requiring these large sizes.

Detachable Rims on Wood Wheels

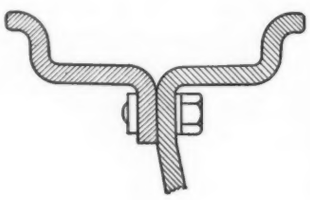
In the design of wheels to take pneumatic truck tires there are a few fundamentals which your wheel engineers should always keep before them. First, the rim portion of the wheel must have adequate strength to resist the tremendous bursting pressure exerted by the air in the tire. I cannot emphasize this too strongly from a "safety first" point of view. I give below a table which shows the total force exerted by the air tending to blow the side rings from the wheel when the tire is under normal inflation pressure.

So far as I personally have come in contact with wheel makers in an advisory capacity in the matter of design, I have insisted on not passing on the merits of a wheel design until the wheel under question has gone through a high-pressure test, which simply consists of mounting on the wheel a regular tire, inner tube and flap, then pumping in water (having first exhausted all the air from the inner tube) to 350 lb. pressure. The government specifications for tires call for tires to stand 350 lb. bursting pressure in order to be satisfactory, so we naturally feel that the same figure should be used on the wheels.

In many of the wheels we have tested we found them very weak and not standing half of this pressure, and fortunately when we pointed it out to the wheel makers, they have been very glad in every case to take the suggestion and correct it. But above all things, this point should be taken seriously, that if anything happens to the rim portion so that the rings blow off, it will be very disastrous to life and limb because of the tremendous amount of energy stored up in the air in the tire.



Detachable tire rim with side and locking rings



Rims parted in center plane

Forces Acting Horizontally on the Pneumatic Tire Rims, Tending to Blow the Side Rings Off

Tire Size	Hydrostatic Test Pressure Lb. sq. in.	Horizontal Force of Rim Circumference Lb. in.
3½"	300	367
4"	350	517
4½"	350	578
5"	350	665
6"	350	766
7"	350	889
8"	350	1,068
9"	350	1,244
10"	350	1,408
12"	350	1,759

Rim Form Must Be Standard

The second point of importance in the matter of design is the necessity of making the rim portion of the wheel so that it will conform strictly within the standard tolerances as prescribed by the Tire and Rim Association. This is necessary so that cutting or other bad troubles will not develop in the tires.

The third important point in the matter of design in the rim portion of the wheel is that of providing the proper facilities for mounting and demounting the tire. There are several ways of handling this. One very satisfactory way is to design the rim portion of the wheel to take the side and locking rings such as have been the fundamental for passenger car pneumatic rims since they were first invented. One of the most satisfactory types is shown in the sketch appended to this paper. In this case both the side and locking ring are hot rolled sections which the rim companies are in a position to supply. It is considered optional whether the inside flange of the wheel is a permanent fixture or removable; in fact, it is a duplicate of the outside side ring. In the event that this design is used, the wheel maker should consider that he is bound to furnish these rings, and it is very important to make sure that they are sized properly, and in order to be satisfactory the lock ring should be of 0.30 to 0.40 per cent carbon steel so it will have spring enough to snap into the gutter of the rim.

An alternative design in the matter of fastenings which seem to have some prominence is that of having the rim portion split circumferentially in such a way that the two halves of the rim may be bolted together, the disc wheel being typical of the proposition.

Provision for Tire Valve

The fourth point of importance in designing is to make proper allowance for handling the tire valve. At the present time we find that the internal gear drive wheels are being used more and more on motor trucks. It happens that the housing for these gears are sufficiently large to interfere with the valve in its normal position, consequently it is necessary for the wheel designer and tire manufacturer to work pretty close together on this. The matter of handling this valve situation satisfactorily is still going through the development stage and accordingly it is not possible at this time to indicate just what the final disposition will be. However, one of the most promising solutions we have is a type of an offset valve which brings the valve out near the side of the rim instead of down through the center line. In using the ordinary straight valve it has been found entirely practical to slot the wheel away through from the edge to the center of the wheel, and if the wheel has the proper strength no trouble will show up.

Fifth, it is very desirable if possible to treat the tire

seat portion of the wheel with some rust-proofing compound because of the fact that even with all precautions that may be taken there is a strong tendency for rust to form, making it difficult to remove the tires quickly and whenever needed.

In conclusion I simply want to emphasize that whatever treatment the design of the wheel has received, it is extremely important that all "Safety First" considerations be respected, and that the rim portion of the wheel should be fool-proof. That is, there should be only one way to manipulate the attachments and that the right way, so there would be no chance of an inexperienced man making a mistake either to the injury of the tire or to result in a disastrous accident.

Building a Truck Body for Every Purpose

AN all-purpose truck body designated as the Everyway Body is announced by The Highland Body Mfg. Co. and one of the first truck manufacturers to add it to its body equipment line is The Commerce Motor Car Co. The body has been designed to meet the demand for a motor truck body that will enable the farmer to use his truck economically to haul a load every way. It also will find a market with city truck users because of the diversified loads it will carry.

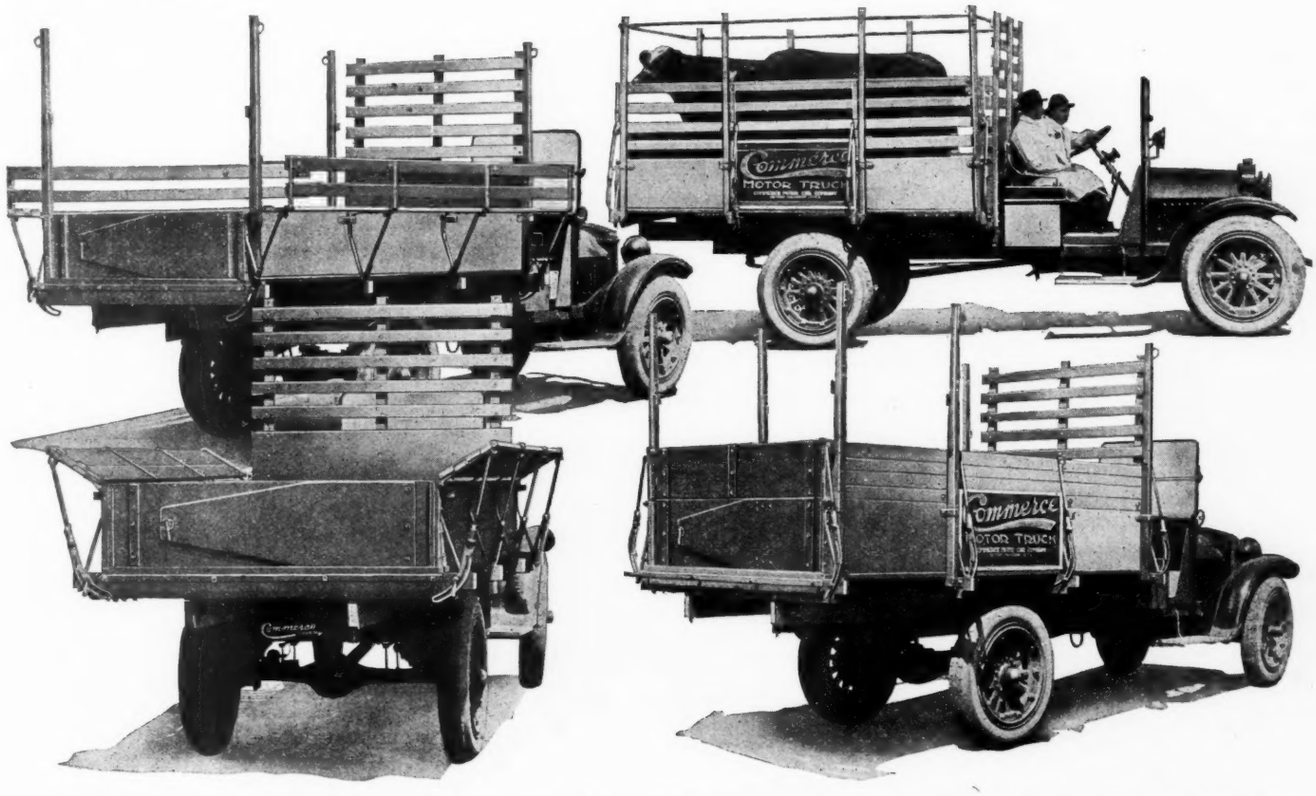
The body is made in three sizes as follows:

Truck Capacity	Load Space	Cu. Ft.	Weight
¾-1 Ton.....	62x 96	55- 96	800
1½-2 Ton.....	62x126	72-126	850
3 -3½ Ton.....	62x144	63-144	1,000

The body is self-contained; all parts that go to make up the various designs into which it can be converted are on the truck at all times, thus making it possible to change the body to suit any load at any time and any place. The body is well within the S. A. E. allowance and at the same time sufficiently rugged.

All sills, floor boards, slats and stakes are of well seasoned oak; joints in floors are tongue and groove and the panels are rabbetted into the floor, and all joints are made up with white lead. This gives a grain tight body, one, it is claimed, that will not absorb moisture and deteriorate. All reinforcements have been designed to give maximum strength with minimum weight. When merchandise must be protected against the weather, provisions are made for the use of a paulin.

ACCORDING to an article in a German engineering periodical, a new automotive fuel has been marketed in Germany, consisting of a mixture of equal parts of benzol and Diesel-engine oil. Its practicability has been tested by the Road Vehicle Testing Commission, Berlin. The material will be used as a substitute for gasoline and benzol until further notice. It is of yellow to reddish-brown color, has a specific gravity of 0.84 to 0.895, and evaporates between 68 and 300° C.



Four views of the all-purpose body. The upper left shows the basket rack arrangement or passenger bus, with flare boards, for hauling fruits and vegetables in containers or for carrying passengers. Below it is the low grain tight body, with flare boards for hauling loose or sacked grains. Stakes, when not needed, are stored under the rear of the body and the flare boards may be let down horizontal to obtain a hay rack. To the right is shown the stock rack, which has a water tight under body and is easily cleaned, and the high grain top body. The latter has a 12-in. extension above the ordinary side boards

The Need for Civil Aerial Transport

PART II

In This Continuation of the Article Begun Last Week, Doctor Durand Takes Up the Transportation of Commodities, Such as Mail and Perishable and Non-perishable Freight. This Article Completes the First Section of His Excellent Review of This Subject

By Dr. W. F. Durand

THE Postoffice Department of the United States has already made an excellent start in the way of developing the experience necessary to plan definitely for a very considerable extension in air transport as applied to the mail service. For more than a year mail service has been maintained between New York and Washington and with a high degree of reliability and efficiency.

The chief characteristic of any mail service is the transport of intelligence, comprising letters and communications relating to business and personal matters, and with all grades and degrees of importance regarding time of transit and urgency of prompt delivery. Here in general the weight of the letter or communication is trivial compared with the value or significance of the information which it may contain. Hence in case of time urgency the high speed and air line route of air transport, with the consequent saving of time, become of special significance and may well justify the extra charges that are naturally found necessary in order to cover the expense of this form of transport.

While the same limitations and characteristics exist for the air transport of mail matter as for other forms of transport, since they are inherent in the airplane as it now exists, it appears nevertheless that they are of less relative significance, and that under a charge adequate to cover the extra expense the air transport of mail matter may be developed as an effective and significant factor in our mail service as a whole.

Thus while the total load carried may be moderate or small, it may be nevertheless of extreme importance and significant from a business, a political or a governmental point of view and thus amply justify the charges necessary to secure the quickened transport and earlier delivery which air transport will insure. Again the investment costs and costs of operation may be high in comparison with the weight carried. All these, however, are aspects of the financial problem and affect chiefly the charge which must be made against the matter carried. If the latter can be made adequate these factors present no further difficulties.

The Safety Factor

The matter of safety may be somewhat less for the pilot than for the attendant in a railway mail car, at least in comparison with the amount of mail handled. Yet the experience of the service between New York and Washington shows that with tested and skilled pilots the danger of casualty becomes very small indeed; so small, in fact, as scarcely to enter as a business matter into the cost of the service. That is, experience shows that under conditions which may be reasonably anticipated and with skilled and tested pilots, the government could insure the lives of such pilots against accident incident to the service, without adding in a significant degree to the operative costs of the service. Again it should be noted that, as a rule, an accident in the air does not necessarily imply the loss of the mail matter. It would imply at the most a delay in transit, and experience thus far indicates that the amount of mail matter which is likely to be delayed due to such accidents will be vanishingly small.

In a similar manner the degree of dependence on the weather has been found to be less than might have been expected. Bad weather increases somewhat the hazard, but with a skilled pilot the degree of disturbance in schedule due to such causes has been found to be astonishingly small. Experience shows, in any event, that with skilled pilots the weather does not present such a degree of difficulty as to seriously dislocate the average time schedule of the service.

Auxiliary Transport

The limitations regarding landing fields and auxiliary service between landing fields and postoffice exist the same as in the case of transport of people and as already noted. These may, however, be provided, usually without special difficulty. The transport from landing field to postoffice is entirely analogous to the similar means required in the case of railroad or steamship transport.

Aids to navigation, including route and location signals, are also requisite, but for daylight flying at least these become of less significance as the pilot becomes familiar with his route flying back and forth day by day.

It is interesting to note here the difference between the air transport of passengers and of mails with reference to the factors which determine the greater present availability of such transport for the latter than for the former. These are chiefly as follows:

(1) Mail matter will stand a higher rate per pound than the human body, especially when the latter belongs to the average citizen.

(2) With mail matter the element of hazard involved does not affect seriously the presumptive safety of the matter in transport, and the average individual who sends a letter by air post is not, of course, directly concerned in any added hazard to the pilot.

(3) The various special features of equipment required, landing fields, auxiliary service, etc., are all

within the range of provision without serious or special difficulty.

In a single statement the air transport of mails does not depend on the taste or fancy of an individual as to elements of personal risk or comfort, and when once the matter carried may be made to pay the charges necessary to cover the cost, the undertaking becomes possible as a business proposition.

It is here, moreover, that the public mail service occupies a peculiar position. For the sake of developing a new and important means of mail transport it might be entirely justifiable to place the charge against the matter carried at a figure below that which would make of the undertaking a complete and self-supporting service, viewed as a business proposition. The differences could then be absorbed by the service at large. This would be the more justifiable in the view that such development is in the nature of a public service which will aid in developing and determining many of the factors which enter into the problem of the successful air transport of commodities and, furthermore, with the improvements which may be anticipated as a result of such experience the costs may ultimately be reduced to figures which will make a definitely self-supporting branch of the service, and at a cost per letter-mile or per pound-mile of matter carried sufficiently low to insure a very considerable share in the carriage of postal matter. This means in effect the applications of the possibilities of air transport to mail service under conditions which will not yet require such service to stand on its own feet financially from the start, and which may thus be carried through its development stages until final data shall have been reached. Such data will then be directly available in helping toward the solution of many of the other problems of air transport initiated by private enterprise and where the enterprise must stand on its own feet as a financial proposition.

The recent report of the Postoffice Department covering the operation of the aerial mail service for the past year seems to indicate that, as a matter of fact, the service was made self-supporting. It is not, however, quite clear whether the operative costs include proper provision for depreciation and replacement of flying equipment.

In any case it seems well proven that the present cost of the air transport of mail matter may be covered by a charge on such matter not prohibitive in amount and indeed low enough to insure the future of aerial mail transport as a definite factor in the service. Air transport for the mails is therefore a field in which we may look with confidence for marked development and extension in the immediate future and also as a laboratory in which valuable experience will be gained for application to other proposed uses of the same mode of transport.

Air Transport for Express Matter

Viewing this application of air transport purely as an economic problem, it becomes simply a question as to whether the extra cost of this method of transport can be charged against the matter carried at a rate sufficient to make of the undertaking a business success. The costs will develop as a result of the fact that the weight carried will be small relative to the investment costs and small relative to the cost of operation, including fuel, oil, miscellaneous supplies, repairs and maintenance and replacements.

The cost schedule must also include provision for insurance of the air pilots, which, in the long run, someone must pay in some form; also insurance of the matter carried and covering any extra hazard incident to air transport; also expense involved in landing fields, in aids to navigation and in such auxiliary transport as may be necessary to connect the air transport terminal with final destination.

As compared with ordinary means for express transport, the total cost per pound mile or per hundred weight mile will be higher in marked degree. If, however, the advantage of saving in time may be evaluated as worth the difference in express, then the extra charges may be carried by the commodities under transport and a successful business venture will result, otherwise not.

The whole question becomes, therefore, one of economics and is to be approached and studied simply as a business proposition. There is involved no sentiment, no matter of personal tastes, no element of appeal to the commodity carried as in case of passenger transport. If air transport can compete economically with other means, there will then be a fair opening and excellent promise of extension in this general field of the transport service. If it cannot, however, compete economically, having due regard to the possible saving in time, it cannot be considered as an immediate factor in this particular field of service.

The indicated equipment for service of this character would comprise large planes of moderate to good speed and specially designed for weight carrying capacity, for safety and reliability.

The requirements regarding landing fields, aids to navigation, auxiliary transport service from termini, etc., are entirely similar in general character to those indicated previously in connection with other types of service and need not, therefore, be further referred to here.

Perishable Commodities and Special Food

The general consideration affecting transport of such commodities are similar to those already noted in connection with express matter, with this difference, however, that generally the value per pound of such commodities will be less than for express matter, and they will be less able to carry the high rate of charges necessary in order to insure an adequate return. If epicures in northern cities were willing to pay adequate prices for southern fruit and vegetables brought through in from 5 or 6 to 10 or 12 hrs. instead of from one to three days, there might be developed here a useful and profitable field for air transport. This case is one in which the saving of time becomes the leading factor, and if an adequate charge can be carried by the commodity the matter will become a plain business undertaking.

The elements of cost will be similar to those involved in the transport of express matter and need not be recounted again. There will also develop the same need for landing fields, aids to navigation and auxiliary service from termini to the origin of the matter carried on the one hand, and to the ultimate destination on the other.

With the present economic conditions it does not seem probable that, in the near future, such commodities could carry the high charges necessary, and hence air transport does not seem likely to develop rapidly as a significant factor in these fields of transport service.

Miscellaneous and Heavy Freight

The same excluding condition seems likely to prevail here as with the next preceding classes of matter, and in still highed degree. The characteristic of such freight is, as a rule, small value per pound. Also in some cases the bulk is large per pound or otherwise the value is low per cubic foot. The same elements of cost will enter as with express matter, for instance, and with the same need for landing fields, aids to navigations and auxiliary transport service at termini. In this and all such cases it will be difficult, if not impossible, to justify air transport as

an economic undertaking in competition with other existing means.

Economically, therefore, these classes of commodities are likely to be excluded from consideration for air transport where other standard means (railway, ship, motor truck, etc.) are available.

In the above cases of express matter and freight matter of various classes, the problem normally arises in connection with competition with other present existing and accepted means of transport. Under these conditions, as we have seen, the economics of the present situation will not, as a rule, make practicable, as a business undertaking, the use of air transport.

Cases may arise, however, when there is and, from the nature of the case, there can be no such competition. These cases may arise where there is no measurably direct route or road of any kind between points for which means of commodity exchange are desired. In many cases, furthermore, on the confines of civilization routes or roads do not exist. In some cases such routes or roads for normal land transport, due to natural difficulties, would be impracticable, or if constructed would be so long and devious or so expensive as to involve the laying of a specially heavy charge on all commodities transported over them.

Such natural difficulties in connection with land transport and such absence of the usual means of transport exist in all degrees and grades and in all combinations, especially in new countries, in the arctic regions and commonly on the borders and far-away outposts of civilization.

It is here that the air route, independent of the accidents of natural topography for a roadway, may come into its own and find a definite and significant application. In many such cases the economics of the situation would become quite reversed and would show in favor of air transport as against road construction and the use of the common methods of transport.

Even here, however, there will exist, as always, the need of landing fields, aids to navigation, etc. Also if the nature of the intervening topography is such as to render landing en route difficult or impossible, such fact will exist as an added hazard which must be considered and given an economic value in any careful examination of the case. All such cases should indeed be examined with care and due weight given to all factors entering into the final charge against the commodity, etc., to be carried; and it is in such cases, where normal transport does not exist or where it could be realized only under difficult or expensive conditions, that air transport will find its first and best chance of special usefulness as a factor in the transport of commodities.

The Nailing of Boxes

OBSERVATIONS of packages which have failed in service and tests on packing boxes by the Forest Products Laboratory, Madison, Wis., have shown that the most common defect in box construction is inadequate nailing. Attempts to strengthen boxes by the use of thicker lumber without regard for nailing very often only waste material. The extra wood may not be needed so much as a few more nails. As an aid in determining whether or not a box is inadequately nailed, the laboratory offers the following information.

The woods commonly used in box construction may be divided according to nail-holding ability and other properties desirable in box woods, into four groups, as follows:

GROUP I		GROUP III
Alpine fir	Redwood	Black ash
Aspen	Spruce	Black gum
Balsam fir	Sugar pine	Maple, soft or silver
Basswood	Western yellow pine	Pumpkin ash
Buckeye	White fir	Red gum
Butternut	White pine	Sycamore
Cedar	Willow	Tupelo
Chestnut	Yellow poplar	White elm
GROUP II		**GROUP IV**
Cottonwood	Douglas fir	Beech
Cucumber	Hemlock	Birch
Cypress	Larch (Tamarack)	Hackberry
Jack pine	So. yellow pine	Hickory
Lodgepole pine	Va. & Car. pine	Maple, hard
Magnolia		Oak
Noble fir		Rock elm
Norway pine		White ash

All the species in one group are used interchangeably as regards thickness of material and size and spacing of nails.

Tests have shown that cement-coated nails have a holding power from 10 to 30 per cent greater than that of uncoated nails. Smooth nails are more effective than barbed nails. The penny of nail to be used in any case is determined by the thickness and species of wood in which the point of the nail is held after driving. The following schedule is based upon standard cement-coated box nails. If the designated penny of nail is not available, use the next penny smaller and space nails proportionately closer.

Schedule of Nail Sizes

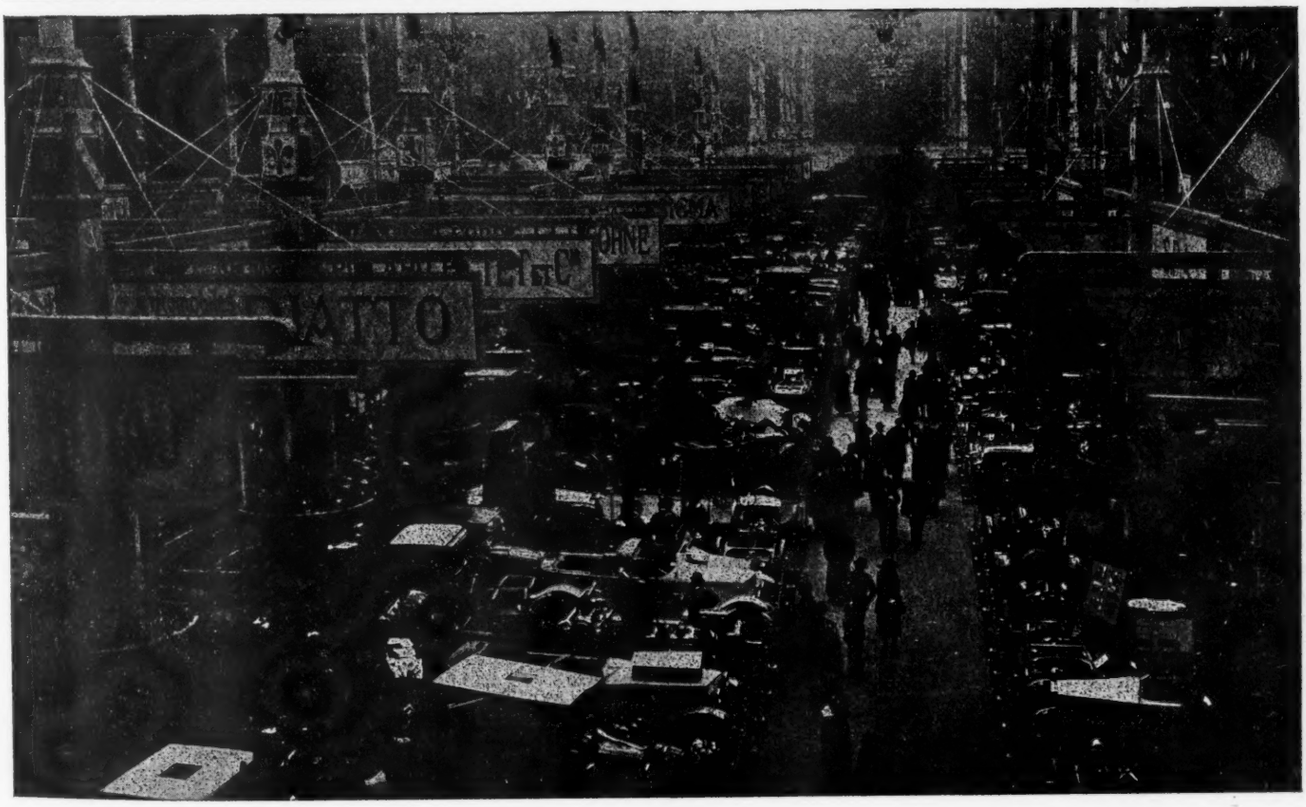
Species of wood holding nails	Thickness of ends or cleats to which sides, tops and bottoms are nailed: ⅝" or less	7/16"	½"	9/16"	⅝"	11/16" or ¾"	13/16"	⅞"
	Size of cement-coated nails							
Group I.....	4d	5d	5d	6d	7d	8d	8d	9d
Group II.....	4d	4d	5d	5d	6d	7d	7d	8d
Group III.....	3d	4d	4d	5d	5d	6d	7d	7d
Group IV.....	3d	3d	4d	4d	4d	5d	6d	7d

Space nails holding boards to end grain of end 1¾ in. apart and nails holding boards to side grain of end 2 in. apart, when nails are 6 penny or less. Increase spacing of nails ¼ in. for each penny over 6. No board should have less than 2 nails at each nailing end. Space nails holding top and bottom to sides 6 in. or more apart, when nails are 6 penny or less, increasing the spacing 1 in. for each penny over 6.

While such spacing may appear to be too close, as a matter of fact, it calls for only about two-thirds of the number of nails which would cause excessive splitting of the ends, and only about two-thirds of the number required to balance the strength of the nailed joints with the strength of the box in other respects. With the spacing given above, the nailing is still the weakest point of the ordinary box.

THE Independent Oil Men's Association, at a meeting in Chicago, stated that the automobile industry will increase 250 per cent during the next three years and that 15,000,000 vehicles will use fuel oil. He declared that, unless there is co-operation between the oil interests and the Government, America will not be able to provide oil to permit this great expansion.

Two Views of the Paris Show



Brazil Holds Great Possibilities as a Car Market

Brazil bought nearly $5,000,000 worth of automotive equipment in 1913. That record has not been equalled again and in 1915 the total dropped below $200,000. But since that time there has been a steady increase, with a still greater increase in sight, according to a study of the country. During the last fiscal year, the Brazilian purchases were more than $1,500,000. It is a country worth watching.

By Allen Sinsheimer

THE scarcity of good roads and the enterprise of European automobile makers have been the chief obstacles to the growth of American automobile exports to Brazil. Nevertheless, Brazil is an automobile market of great potential value, according to an analysis by the Bureau of Foreign and Domestic Commerce.

A country of 26,000,000 inhabitants, with an area of 3,200,000 sq. miles and an annual foreign trade of $600,000,000, it offers a market worth the consideration of every American exporter.

In the years immediately preceding the war, American exports to Brazil increased gradually, reaching the highest point in 1913, after which followed a decline until 1916, when European manufacturers were unable to ship cars. This increase continued until 1918 when automobiles sent to Brazil from this country totaled 56 per cent more than in any previous year. The exports dropped 3 per cent in number during the fiscal year 1919, but increased 35 per cent in value over 1918.

Export figures show that the total value of American automobile trade with Brazil for the year ended June 30, 1919, was $800,000 more than in the fiscal year 1918, $1,200,000 greater than 1917 and $1,300,000 more than the best pre-war year, 1913. There was also a decided gain in the number of trucks and motorcycles shipped, the number of trucks being 200 per cent greater than in 1918 and 100 per cent more than in 1913. The average price of passenger cars shipped to Brazil in 1919 was $913, or $279 more than the 1918 average.

Prior to the war, Brazil imported automobiles chiefly from Europe, due in great part to the prosperous era, and a demand for the luxurious cars manufactured in France, Germany and Italy, which were sold on long credits, was another important factor. Brazilian statistics show that, in the calendar year 1913, France sent Brazil the largest number of automobiles, or 953 cars valued at $1,631 each; Germany sent 613 at $1,665 each; Italy, 412 at $1,426 each; Great Britain shipped the highest-priced machines, 112 at $2,011 each, while Belgium contributed eighty-three at $1,605 each. The United States held second place in number and third in total value, shipping 814 cars at the lowest average price, $977 each. These statistics do not, of course, coincide with the record of automobile exports from the United States in the fiscal year 1913, since they cover a different period and are based on values at port of entry.

Brazil's pre-war imports of automobile tires were almost wholly from Europe, the share of the United States in this trade having been only about 3 per cent in 1913, or $24,300 out of a total of $746,000. In 1914, the total tire imports amounted to $477,000, of which the United States contributed $15,700. Later, the imports of American tires greatly increased, amounting in 1917 to $654,000, equal to 71 per cent of Brazil's total tire imports of that year, which were valued at $918,000.

The total, nearly $5,000,000, reached in Brazil's automobile imports in 1913 has not since been equaled or even approached. The lowest ebb was in 1915, when the

American Exports to Brazil

	Commercial Cars		Passenger Cars		Parts	Tires	Motorcycles		Total
Year	No.	Value	No.	Value	Value	Value	No.	Value	Value
1910	(a)	.....	64	$ 67,687	$ 7,802	.....	...	$ 7,370	$ 82,859
1911	(a)	.....	181	215,083	15,769	$ 10,112	...	16,833	267,797
1912	(a)	.....	554	662,833	35,680	24,942	...	17,596	741,101
1913	36	$75,073	987	1,035,247	108,859	47,537	57	12,090	1,278,806
1914	13	20,449	299	214,992	84,602	11,839	61	10,935	392,817
1915	3	2,861	81	54,939	28,633	77,425	43	7,743	169,601
1916	11	19,685	252	157,968	59,935	295,479	78	9,966	542,983
1917	14	8,300	873	523,383	134,326	696,816	88	16,051	1,378,936
1918	24	31,133	1,575	1,000,011	223,414	455,102	94	23,387	1,733,047
1919	76	81,237	1,436	1,312,057	527,305	667,319	119	37,801	2,625,719

The Automotive Purchases of Brazil

Year	Total Number	Total Value	From U. S.	From France	From Italy	From Germany	From United Kingdom
1913	3,218	$4,824,958	$ 795,754	$1,555,232	$587,711	$1,020,675	$225,335
1914	714	1,094,241	165,152	335,006	115,846	160,083	81,812
1915	214	199,358	123,390	20,044	21,189	2,261	10,924
1916	521	465,991	406,787	15,756	15,351	.....	6,664
1917	1,648	1,412,236	1,351,793	2,992	9,164	.....	955
1918	1,448	1,599,097	(a)	(a)	(a)	.....	(a)

(a) Detailed statistics not yet available for 1918.

total value of the automobiles received was less than 4 per cent of the value of the 1913 imports of this class. In 1918 the receipts grew to about a third of the 1913 record.

It is interesting to note that, while in 1914 Brazil's total imports of automobiles dropped to less than a quarter of the 1913 receipts, the respective shares of the countries of origin changed little, France continuing in first place in point of value, the United States moving to first place in point of number, and Germany taking third place in both number and value. Since 1914 the United States has held the leading place in quantity as well as value, shipping 65 per cent of Brazil's total automobile imports in 1915, 87 per cent in 1916 and 95 per cent in 1917. The average value of the 1,574 cars imported by Brazil from the United States in 1917 was $858; the five cars from Italy averaged $1,832 each, one from France, $2,992, and one from Great Britain, $955.

The Trade Trend

The increase in the Brazilian imports of the lower-priced cars from the United States indicates the trend of the automobile trade in Brazil toward lighter machines. The popularity of American cars has grown with the knowledge of their practical value and their power to negotiate rough Brazilian roads. While the American automobile proves its usefulness on poor roads, it is leading to an interest in the improvement of highways. After the coming of railways, Brazilian roads were neglected except in the sections where neither railway nor steamship service was available for the transportation of products.

In 1917, the President of Brazil was authorized to grant a subsidy of $500 per mile of highway constructed for transportation of passengers and freight by automobiles, $250,000 being appropriated for this purpose during 1918. Some of the states give co-operation in this work. During last year nine new highways from Rio de Janeiro to the boundaries of the Federal district were constructed, these aggregating 20 miles in length. The city itself has few good driving streets, but there may be found a fine macadam road that winds for many miles along the shore of the bay, and the famous sea speedway. There are also a number of beautiful mountain drives within a few miles. A large number of elegant taxicabs are used in Rio, due to the fact that during the financial depression wealthy Brazilians found it necessary to dispose of their European cars.

An automobile road is now being constructed between Rio de Janeiro and Petropolis, 25 miles long, and is expected to be exceedingly popular. Rio has a passenger car for every 400 persons, the city's population being estimated at 1,000,000, with an automobile registration in 1918 of 2,508, of which 959 were private cars, 1,284 taxicabs, seven buses, thirteen demonstrating cars and 265 motor trucks. The field is ripe, it is reported, for the demonstration of modern trucks, as most of those in the city are old types. The greater number are run by private owners, about fifty being offered for hire. Approximately 75 per cent of the private passenger cars are four-passenger models, 25 per cent two-passenger cars, and a sprinkling of six-passenger cars completing the total. The motorcycle registration in 1918 numbered 147.

Import Via Santos

Prior to the war, automobiles were imported in equal numbers through Rio de Janeiro and Santos, but in the last few years the greatest number of cars—70 per cent—have gone to Santos, the port of the coffee growing state of Sao Paulo, which has about three times the population of Rio de Janeiro and includes 3,500 cars and trucks in its territory. There is an increasing demand in this district for all grades of American cars. The following table shows the imports into Sao Paulo from the principal countries of origin from 1910 to 1917:

Year	Total No.	Total Value	From U. S.	From France	From Italy	From Germany
1910	97	$168,478	$23,613	$61,952	$27,081	$31,666
1911	296	408,310	77,262	127,114	81,971	75,840
1912	1,121	1,434,547	289,335	481,927	346,716	211,063
1913	1,318	1,654,082	375,577	665,101	318,676	139,869
1914	325	296,386	90,205	76,616	76,699	4,796
1915	166	134,999	97,210	10,561	17,063	.....
1916	387	331,520	303,400	4,906	12,519	.....
1917	1,133	902,249	887,859	.....	6,404	.....

It is evident that this state is the best automobile market in Brazil and especially for high-grade cars, due chiefly to the prosperity caused by the coffee plantations. The field for passenger cars is somewhat limited but the large shipping business at the port offers a good market for motor trucks. The streets of the cities are in good condition and the roads are picturesque and well kept.

Highways are being constructed where necessary and extended into a number of other cities, including Minas Gereas, where 372 miles of automobile road are in operation and 922 more under construction. Parana has 235 miles in operation and a number of other roads are under way. Santa Catharina, south of Parana, which has no railways, maintains eighty first-class highways.

Comparatively little attention has been given to highway improvement in Rio Grande do Sul, the southernmost state of Brazil, although 28 miles of new roads were completed there last year. The natural highways are fairly serviceable for light cars.

Starting north from Rio de Janeiro, road construction is found to be a matter of prime interest. A highway has been built between San Theresa and Santa Leopoldina, 20 miles long, financed by merchants and supplemented by government subsidy. It is used for truck transportation of coffee. Prison labor has been employed on these highways by the state of Espirito Santo and is reported to have been successful.

Further north is the port of Bahia, capital of the state of the same name, with a population of 350,000 and with 362 passenger cars and 31 trucks in its boundaries. The streets of the city are narrow and rough, and not a good prospective market for passenger cars but the great amount of hauling necessary for import and export trade makes it a possible market for motor trucks.

The number of cars in Pernambuco has increased rapidly within the past few years, the city streets being fairly good for driving, with four highways extending through the state, totaling 470 miles. The sugar plantations are prosperous and passenger cars and trucks that will stand the severe strain of bad roads are in demand.

The long distance between the leading cities of Brazil and the commercial rivalry in the different sections of the country should be taken into consideration by automobile manufacturers in the distribution of agencies. For instance, Para, the center of the rubber industry and the Amazon trade, is far removed geographically from the principal ports on the Atlantic coast of Brazil. Para supplies a wealthy region and requires its own automobile headquarters. Going south along the coast, separate treatment should be accorded to Pernambuco, to Bahia, to Rio de Janeiro, to Santos, to Sao Paulo and to Porto Alegre. It takes 30 hrs. to travel by boat from Pernambuco to Bahia, about three more from Bahia to Rio, a night by either water or rail to Sao Paulo, via Santos, two nights or more from Sao Paulo to Porto Alegre. It is a serious mistake to tie up all this territory with an agency only at Rio de Janeiro.

Each district should receive careful study with regard to its area, the size and character of its population, as well as the source and extent of its wealth. The American commercial attache at Rio, quoting a practical automobile man who recently made a survey of motor car markets in Brazil, emphasizes the importance of a judicious assignment of agencies.

The agents in Brazil of the leading American cars usually hold exclusive selling rights for a certain territory. This is the most successful method of offering cars if it includes expert demonstration on a liberal scale. A great deal of educational work is necessary and salesmen should have a thorough mechanical knowledge of their machines. The opportunities offered for studying the mechanism of automobiles are not so general in Brazil as in the United States. Comparatively few Brazilians understand the repair or even the care of motor vehicles and persistent demonstrations of sample cars and trucks are necessary to overcome prejudices due to a lack of acquaintance with the operation of automobiles.

Improved Metal Spraying Process

IN a new process for covering articles with a metal spray, due to M. U. Schoop, the ends of two wires are brought to the melting point by passing a comparatively heavy electric current through them, the current density being from 40,000 to 50,000 amperes per sq. in., and the liquid metal particles thus formed are carried off by a jet of air or gas and deposited on the article to be coated. If continuous current is used the wire connected with the negative pole melts more rapidly and must be fed forward 1.6 times as fast as the other one. In the case of alternating current the feed of both wires is the same. The melting and spraying phenomenon is not uniform as in the case of a stationary arc, even if the apparatus works quietly and properly. A careful study has shown it to consist of a quick succession of uninterrupted spark discharges which are accompanied by a special arc. The current density of 40,000 to 50,000 amperes per square inch during the rapid succession of short circuits is so great that the drops of molten metal would be thrown explosively in all directions by the development of metal vapors at high density, if they were not carried in a definite direction by the compressed air jet.

In order that there may be no excess of metal vapor, the potential difference between the wires must not be too high. With the electrical metal spraying pistol a pressure of 30 volts is used. To lower it still further is inadvisable as the wires then melt away too slowly. With a wire diameter of 0.032 in. this voltage gives a current flow of 35 amperes. The rate of feed of the wires is 6-9 ft. p. m.

An air pressure of 50 lb. p. sq. in. is generally used, but is not closely limited as in the case where the wires are melted by a gas flame. This permits of more finely spraying the metal and insuring a better bond between the object and its coating. Aluminum or copper sprayed on glass under an air pressure of 80 lb. p. sq. in. cannot possibly be removed without causing smaller or larger glass splinters to become detached. Microscopic investigations have shown that the glass at the points of contact is raised to the melting temperature and intimately unites with the coating. It is essential in this connection that the metal particles be absolutely pure and the temperature at contact high. On the other hand, it is possible to coat readily inflammable material like paper and celluloid with metal by this process.

Uneven Coatings on Wood Cause Warping

COATINGS of equal moisture resistance should be applied to all surfaces of a wood product which would give dissatisfaction if it were to warp in service. Tests at the Forest Products Laboratory have shown that even when wood is properly kiln dried no coating entirely prevents it from picking up or giving off moisture and, consequently, from swelling and shrinking under the influence of varying atmospheric conditions. Varnish, shellac, and other moisture-resistant finishes merely decrease the rate at which the moisture changes in wood occur. The higher the grade and the more coats applied, the slower will be the moisture changes.

Unequal coatings on opposite surfaces of a wooden article cause unequal rates of change in moisture content and hence unequal shrinkage on the two sides of the piece. The result is that the wood tends to cup or twist out of shape.

Industrial Insurance

ONE of the most liberal and far-reaching insurance plans attempted by any large American industry has been put into effect by the Pfister and Vogel Leather Co. By its plan, workmen's compensation law, which protects employees against industrial accidents, is supplemented for ordinary accidents and disease all of the 24 hours of the day.

What a Newspaper Man Thinks of Automobile Publicity Copy

Wherever newspaper men meet, there are certain to be jokes about the great mass of automobile publicity copy that descends upon the editor of the automotive page. Automotive Industries asked Robert E. Lee, who for eight years has handled such copy for the St. Louis Post-Dispatch, to write a criticism of this copy. No effort was made to guide Mr. Lee, who is a newspaper writer, periodical editor and practical advertising man.

By Robert E. Lee

I HAVE often wondered if the men who write publicity stories for automobile manufacturers ever read their own copy, either in typewriter or in the newspaper. I feel quite sure that if, where some of their copy accidently gets in, they did read it, they would laugh out loud at the gullibility of the automobile editor who used it. For instance, how does this sound in cold type:

> "The new Speedbug Beauty Six is the most wonderful creation which has ever been produced by the Speedbug company, and it stands without a peer among automobiles for charming design, wonderful motor, softly buoyant springs and upholstery that vies with the bridal chamber at the Waldorf-Astoria."

There are two reasons why the above sort of stuff should not appear in the newspapers. The first of these is that it is bunk. The second is, that as written, it makes the newspaper say these exaggerated things about the automobile, and when the newspaper thus fathers such a statement it is offending makers of all other automobiles grossly, and it must be remembered that the other makers are just as good advertisers as the Speedbug company. I believe that during the last nine or ten years, as an automobile editor of a daily newspaper, I have thrown away two tons of well prepared and well typed publicity matter from automobile concerns because it was wholly and totally unfit for use, because it was impossible stuff, because it was all brag and no interest and because it was grossly selfish in construction.

The publicity man for the automobile manufacturers seems to feel that the automobile editor is some sort of a confiding, innocent youth, who knows nothing about the automobile as a piece of merchandise, and who can be induced to print a half-bushel of fulsomeness if it is put up to him in the shape of nice looking copy.

As a matter of fact, the automobile editor of almost any newspaper is a smart guy. Don't forget this means you can usually spell the word "smart" thus—SMART. His province in life is to make the automobile business of his particular city go. About two-thirds of the agencies for automobiles are placed through automobile editors, who happen to know of an available dealer whom they recommend to the visiting district representative of the factory.

The automobile editor is a psychologist, a physiognomist and a physiologist of men in business, and the day has long since passed when he would take any sort of an old story about the wonders of somebody's car and print it in such a way as to make his paper, and himself, responsible for the false and misleading, or over-optimistic statements made. The day has also passed when the automobile manufacturer may send to the newspapers of the country stories a column and a half or two columns in length and demand that they be printed. These demands are never met. The publicity man finds, to his horror, that his two-column story has been cut down to two sticks, or that it is has been omitted entirely because it could not be hacked off at the end of the first page.

In the long ago, when matter of that kind was used it was not because the automobile editor was easy, but because he was tolerant. It will be found nowadays that he is not tolerant of poor stuff, and if the automobile manufacturer or the accessory manufacturer hopes to secure publicity in the automobile columns of the better newspapers, he must write the stories from the standpoint of the public's interest.

One way to find out what the public interest would be, is to watch your own son, or your wife, or your brother-in-law, as they read the autmobile page of your favorite newspaper. Note which of the stories seems to interest them and use it in a general way as a model. I would say that stories of unusual performance of cars, about unusual methods of production, unusual output, unusual parts or accessories that have been added to a car, or the unusual features of new models, make good copy.

The fact is, that copy which says the "Speedbug Six is the most beautiful car in the world," is the kind that goes into the waste basket, and each Saturday morning in every newspaper office in the country there is a large waste basket full of this kind of copy taken to the paper baler to be sold at two and three-quarter cents per pound.

This is all at the expense of the automobile manufacturer who hired the publicity man, who wrote the story which was posted at a cost of one or two cents per newspaper, and which eventuated in the paper mills of Massachusetts, to be made over into new paper, to be used again by the same publicity man for sending out the same kind of poor copy, which went to the same automobile editor, and was put in the same waste basket, and so on, ad infinitum.

Estimates Should Parallel Cost-Keeping Method

In this article, the estimate and cost-accounting systems of the Fox Machine Co. are described in detail, giving the methods in which this difficult but necessary part of foundry work is performed. Work analyzed on the estimate sheet should furnish a record useful for future work is a part of the idea in the Fox plan

ESTIMATES on foundry work can be checked back against cost far more satisfactorily if the original estimate is analyzed along the same line as the cost sheet. The Fox Machine Co., which operates a foundry doing considerable outside work, has evolved a system which not only tends to prevent mistakes in making the original estimate but which provides a means of analysis that greatly increases the accuracy in cost accounting and does away with guesswork.

It is, of course, extremely hazardous to give bulk estimates. The estimate should be analyzed and departmentized just as the cost keeping itself is departmentized. In this way, the variable factors are confined to the particular departments with which they are bound up and the result is that it is possible to reduce the percentage of error to such an extent that, after a moderate experience, it becomes negligible. The forms illustrated give an outline of the method in use by the Fox company.

The work in the foundry is divided under eight heads in making the original estimate, these departments being those of mixture, molding, overhead, cleaning, core material, core labor, overhead, casting loss. The sheet used for the purpose of making the estimate is shown in Fig. 1. This forms part of a loose-leaf booklet and afterward becomes a part of the permanent file.

The mixture cost, as well as for other divisions of the work, is made on a per-pound basis, the estimate being first calculated on a basis of the first job. The number of pieces to be made is then considered in connection with the cost of producing the first casting, and the estimate computed.

With this sheet showing the estimate as part of the permanent file, it is easy to determine how far out of line the estimate was when the detailed cost was made up. The foundry detail cost sheet is shown in Fig. 2. This keeps a record of the cost by departments that closely approximates those used in analyzing the job for the first estimate. The sheet also gives a record of the scrap for any given job and notes the time consumed for the molding and core work.

Labor Considered Separately

The date on which the order was issued and the number of the order form the determining or recording parts of the cost sheet. At the top of the sheet are given the average weights and names of each of the pieces, while the piece part number is recorded in the upper right-hand corner. The result is that this chart not only tells the cost of each part of the work, but also forms a good record of the job itself from a descriptive standpoint. The number of pieces on the job, the date at which the job or any part was completed, the amount completed and the amount and weight of the scrap tell the story of what was done with the materials ordered for the work.

The amount of material used in making the mixture for the casting and the price per pound of mixture at 1 cent as a standard rate, or at whatever the rate happens to be, gives the total cost of the mixture before any labor considerations or core-making are taken into account. Labor is considered under a separate head on the detail cost

Date_____

Firm_____

Name Piece_____ Po.No._____

Pattern Equipment_____

Weight per piece_____ Quantity Estimated_____

	Per lb.	Each	Cost of 1st job
Mixture			
Molding			
Overhead			
Cleaning			
Core material			
Core Labor			
Overhead			
Casting Loss			
Total			
Profit			
Total			

Price Quoted Customer_____

Production Estimate_____

Remarks:

Fig. No. 1—Used for making estimates

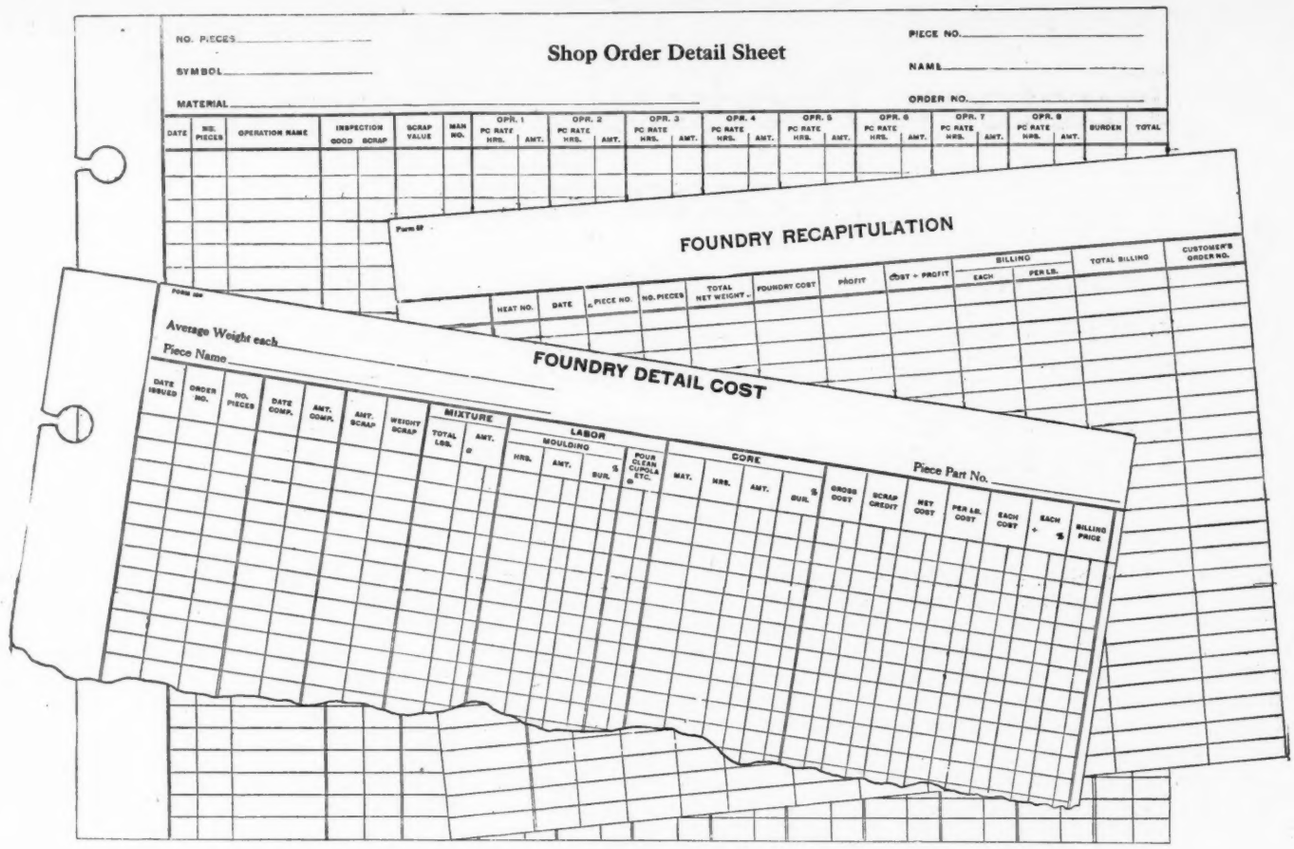


Fig. No. 2—Herewith are shown the three sheets that supplement the estimates

sheet, the work being divided into molding, pouring, cleaning, core-making, etc. The overhead is figured in separately with each of the labor calculations. For instance, on molding the overhead may stand at 35 per cent of the man-hour time. Such work as pouring and cleaning cupolas is figured on a straight per-pound basis, at perhaps a rate of 1½ cents per lb. Core-making may perhaps carry an overhead of 30 per cent. Thus, with the overhead figured separately for the molding and core-making, it is possible to analyze more closely than by attempting to bulk the overhead.

Totaling the cost of the mixture, the cost of the material and labor on molding and coremaking and the respective overhead gives the gross cost. From this is deducted the value of the scrap, giving a net cost figure. Dividing the net cost figure by the number of pieces, times the weight per piece, gives the cost per pound and dividing the cost per pound by the weight of each piece gives the cost of each part. Subtracting the cost per part from the billing price gives the profit which is recorded as a percentage of the billing price.

While sheet No. 2 gives an accurate record of the profit per job, it is necessary to have some sort of foundry recapitulation to tell whether or not the foundry is being operated at a profit and on which jobs the foundry made the best showing. For this purpose, sheet No. 3 has been designed, in which the jobs that have been sent through the foundry have been recorded by individual heat numbers. A study of this sheet shows that it will tell whether or not every heat is being run at a profit and what the variation may reach. The heat number is given as well as the date, the identification number of the piece and the total net weight in the heat. From sheet No. 2 the data is secured to enter a figure on the foundry cost and profit, from which the total figure, or cost plus profit, is determined. Record of the billing by the piece and by the pound and also the total bill is given, together with the customer's order to complete the identification and record of the job.

With the data presented by these three sheets, giving the original estimate, a summary of the foundry cost and a recapitulation on the basis of heats, a close record is kept of the work and a basis for future estimates on similar jobs is readily furnished. After a number of representative classes of work have gone through the factory, there is not much opportunity for important errors in estimates to creep in.

Should the machine work be done on any of the castings, the method of cost keeping for the machine shop follows the same general lines, the cost record being kept by operations. The shop order detail sheet is used for this purpose. If desired, on a complicated piece, the job can be broken into parts and recorded as operations and sub-operations. The shop order sheet gives a valuable record in keeping the machine shop costs, because it permits checking back against the pay-roll at any time. The overhead, labor and material cost are totaled separately.

Distribution of Mineral Wealth

AT the peace conference, where commercial advisers of all the great nations were present, it was possible to gather trustworthy statistics regarding the mineral wealth of the different nations. As regards annual production of minerals, the United States occupies the first place. In 1913, the latest normal year, this country produced 39 per cent of the world's coal, 36 per cent of the iron, 56 per cent of the copper, 37 per cent of the zinc, 30 per cent of the silver, 38 per cent of the molybdenum, 17 per cent of the tungsten, and 65 per cent of the petroleum.

Factory Production From the Human Side

Efficiency from the standpoint of the men who perform the actual productive work is the subject of this week's article by Mr. Tipper. Striking into a new field of engineering—that of the psychological side of manufacturing—he presents thoughts that challenge attention

By Harry Tipper*

MY first excursion into business took me into a factory where naturally the first work which I had to do was the most routine and rapidative machine work and consequently the most monotonous. After working for some little time in this way, I began to study my own reaction to the work, the variations of my own capacity for production and the general reflexion of my outlook from the job itself.

In the course of a number of years of a very close contact with machine industries, I extended these observations to hundreds of workers under thousands of different conditions of work. After some years of this study, I became convinced that the present organization in the machine department of most lines of industry was not efficient and had not been the result of scientific study. I became convinced that in 75 per cent of the work in industry, the job itself offered no incentive to work to capacity and no incentive to remain at work, but that on the contrary most of this work automatically destroyed the interest which was originally given to it by the small amount of mental development required for its continuance and the extreme monotony of its operation.

It has been said by manufacturers many times, with a degree of surprise, which is in itself astonishing, that high wages did not increase production. Of course not; they cannot be expected to increase production; they can be expected only to provide the means of escape from the monotony.

Many and many a time when I was working in the factory as a youngster, the middle of the week found me so thoroughly exhausted with the monotony and the cramped mental requirements of the work that it was necessary to direct my attention toward the escape which would be provided at the week end and to divert my attention from the job itself. During the last two years I have been led by my observations to question the value of the present system of confining one person to one operation for an indetermined period of years, and in order to find out the bases on which this system rested, I took the trouble to go through the bibliography of production, scientific management, motion study, industrial management and industrial relations literature. The result of this excursion was utterly disappointing; I failed to secure any evidence of any questioning of the system; and evidence of a scientific study of its growth or its value; and in no part of the literature had the human element received consideration except as entirely secondary to the machine and the machine equipment.

The research of the psychologists in the last few years has informed us to a great extent in respect to mental processes and the necessities for mental development. These investigations have borne out what the philosopher has suggested many times, that human beings develop mentally only when their forced activities oblige them to exercise their mentality in a constantly increasing degree.

Normal human development, both physical and mental, is only secured when the required activities exercise a variety of the muscles and nerves and also exercise the mentality in different directions. Where the character of the work is almost apparently repetitive, the familiarity with this work and the lack of any stimulation to the intellect which is a condition of its continuance, result in a mental stagnation which is not only detrimental to the work itself but reflects upon all the mental activities in outside matters.

So long as we continue to transfer the skill from the worker to the machine and then condemn the worker to operate the skillful machine without change of occupation, we will be confronted with the impossibility of maintaining an active interest in the work of securing a larger amount of production in a given space of time, or providing any incentive for the operator to persist in that kind of occupation.

In our development of the machine industry and the present factory system, we have taken it for granted apparently that it is necessary to confine the operations of one worker to one specific sub-division of the work. There is no evidence of any attempt to discover the comparative results which could be secured by the adoption of some other system. So long as labor was plentiful and could be secured at what we considered a reasonable price, we were content to use it without any regard to the physical effect of its use and the inevitable consequences of the continuance of that type of organization.

Somehow, manufacturers are loath to admit that the worker is subject to the subconscious incentive that he himself has developed in the course of his experience. Although there are few factory heads who would be willing to operate a repetitive job, such as punching commutator plates for a year, except under the stress of the direst necessity, no engineers who have written about the subject or discussed it in their technical societies have indicated their understanding of this effect upon the worker as a prime factor in the amount and cost of pro-

Paper read before the Pennsylvania Section of the Society of Automotive Engineers.

duction. We have disregarded psychology and amused ourselves with the ridicule of the study of mental processes, referred with pride to the cold-blooded practicality of our own calculations as though any field of endeavor which depends upon human labor could be efficient without a study of the mental processes as a part of the preparation for the conduct of that work.

Some of you may be inclined to question the value of this incentive in terms of actual production. The traditional habit of mind is so strong that we are unable to see a practical value in anything which does not begin and end with equipment and machinery. Here are some cases where the potential capacity was put to work by the provision of an incentive to work and the actual production results secured.

Lord Leverherhue in his book, "The Six-Hour Day and Other Industrial Questions," cites the case of a British manufacturer during the war who had a plant divided into five complete manufacturing units making three thousand complete articles per day each, or fifteen thousand in total. War necessities made it imperative that the plant be moved, but the same necessities made it equally imperative that production should not be held up during the removal. The competitive team work system was put in, with additional monetary incentive, and great care was taken to provide the workers with an understanding of the patriotic necessities for this product. One unit of the plant was moved at a time. After the first unit was moved, four units still produced fifteen thousand pieces; after the second unit was moved, three units still produced fifteen thousand pieces, and after the third unit was removed, two units still produced fifteen thousand pieces. In other words, the incentive had increased the production capacity of a single unit some 250 per cent.

In this country during the war, a manufacturer in Ohio, engaged upon a certain war operation, had developed the capacity of a machine at eleven pieces. The engineers figured it might be increased to fifteen pieces per hour. Workers were trained on this work, were thoroughly trained in the understanding of its importance to the war and the effect of the material on the battlefield. This training was carefully undertaken and the result was fifty pieces per hour. Again the incentive had proved to be capable of providing an increase of 300 per cent.

In many factories during the war period, lectures upon the war and its importance by government agents in order to stimulate production, resulted in increases varying from 50 to 100 per cent in the same factories. In no case which has come under the writer's observation was the result less than 50 per cent increase, due to the enlarged interest in the production necessity.

These results are inconclusive, of course, but they do suggest the advisability of examining the present system of industrial organization with the idea of discovering why so much of the work of industry provides no incentive in itself and how it can be rearranged in order to provide that incentive. The unfortunate part of the matter is that so little study has been given to the human side by the practical man of business that there are no experiments of any moment which can be referred to in connection with such a point. The most complete one which has come to my attention relates to a manufacturer who is in the business of grinding chemicals and was the result apparently of a casual conversation. Some weeks after the conversation occurred, he told me he had been thinking about my criticisms of keeping one man on one job all the time and as a net result he had begun the rotation of jobs in his packing room. There are six specific jobs in that packing room, and he had fixed it so that each worker took one week on each job, making a circuit in six weeks. The result was 25 per cent increase in work and a much more contented set of operators. He has now extended his analysis through the whole business and is preparing to adopt that system all through.

It will take a great deal of care and a vast amount of patience in this to devise ways and means for changing a man's work so that he gets related jobs instead of one job and the possibilities of this kind cannot be gone into thoroughly at this time. The suggestion is being made here because of its importance and because there is no doubt that the production manager of the future will be successful in production because he knows human incentives, human desires and human mental processes, and not because he knows machinery and equipment. He will be successful because he knows people instead of processes and products, and the study of people is not only the proper study, but it is the more fascinating study and requires a much greater mental effort and a much more careful analysis than the studies upon which the production man and the engineer have spent their time up to the present.

Waterproof Glue

IN the manufacture of airplanes extensive use is made of glue, and as the safety of a plane depends to a large extent upon the quality of the glue used in such parts as the propeller and the body plywood, intensive research was directed during the war towards the improvement of this product. Previous to the war hide glues and bone glues were extensively used for this purpose, but these are open to the objection that they are not waterproof. The setting of such a glue is a mere drying process, involving no chemical change, and when the glue is again subjected to a sufficient quantity of moisture it will lose its holding quality and eventually dissolve.

A waterproof glue was found in casein, a milk product. Such glues are manufactured in this country by the Casein Mfg. Co. and are sold under the trade name Casco Waterproof Glue by the United States Plywood Co., Inc. Casco glue undergoes a chemical change in setting and is therefore insoluble after having once set.

During the war large quantities of Casco glue were supplied to the Bureau of Aircraft Production, by whom they were submitted to the following tests before acceptance: Parts united by means of this glue were boiled in water for 8 hrs., baked at 150 deg. Fahr. and soaked in cold water for 10 days, after all of which they must not show the slightest separation. The glue was required to show a minimum shear strength of 150 lb. per sq. in. on plywood.

The glue is mixed as follows: Into the mixer are poured 2 lb. of cold water for each lb. of glue, and the powdered glue is added slowly while being agitated vigorously to prevent the formation of lumps. After the glue has been thoroughly mixed it is allowed to stand for 15 min., and is then used either in spreaders or with the brush, the same as any other glue. The mixed glue will keep for a full day. For small quantities an eggbeater may be used for mixing. Casco glue can be used for gluing glass to glass, wood to metal, cloth to any surface, leather to leather, glass, etc.; steel or other metal to glass, wood fabric, etc.

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The AUTOMOBILE

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Trade Mark Protection

WITHIN the last few weeks exporters have learned of a particularly daring theft of trade marks in a Latin-American country. In this case, a trader entered with the proper authorities a list of 20 automotive accessory trade marks that are becoming well known in this country and England. The articles protected by these marks, it appears, have been developed during the war and were regarded as articles that soon would be appearing in the exports.

The lesson to be gained from this instance is that no manufacturer should ever become so engaged with the present that he forgets about the future. If he has an article that is worth while, he should look to the protection of its good name in all lands, whether he is going to sell in that land or not. The protection, in itself, is worth while.

This is more or less a new question to many American manufacturers. Some firms in the automotive field have made plans for selling abroad only to learn that they could not use their well established (at home) trade marks abroad because some other persons had been using them there for years.

This situation has opened a new field, and has brought into the field a number of new firms which are offering trade mark information and service to manufacturers. A number of the firms undoubtedly are well equipped to render this service and some are not. The manufacturer who is exploring for his company the export field should look well into the standing of the company to which he intrusts this service.

The Stolen Car Problem

THE Federal Bill which makes the removal of a stolen automobile from one state to another a felony has become a law. Now, for the first time, the automotive manufacturer has an opportunity to become a practical aid to the dealer and car owner in combating the theft evil.

Every person engaged in the selling of automotive vehicles knows that the uncertainty of ownership or possession of an automobile has been one of the greatest handicaps in placing cars. Insurance is all right as a last resort, but a claim against an insurance company is a poor substitute for the possession of an automobile when you need the car.

Also, theft and the outrages of the joy riders, have forced insurance rates to an outrageously high figure and this in itself had deterred many purchasers from buying cars because insurance is not an item that can be paid and left to the worries that were, but it is an annual item in the overhead account. Also the steadily mounting rate has influenced car owners a good deal like those who formerly were insured in the fraternal insurance organizations and were driven to other forms of insurance by the steady increase of premiums.

Now there is an opportunity to relieve the situation and the manufacturers, if they do their duty toward the dealers and car owners, must have an important part in this work. They owe it to the owners of their cars just as they do service. They certainly owe such effort to their dealers, for any dealer will tell you that the daily headline in the newspapers "Six automobiles stolen yesterday" is a deterrent to sales, and one that can not easily be overcome.

Perhaps not all manufacturers realize how they can help the situation. The first step should be to select some person in the organization to take charge of the "Anti-Theft Department." This person, if properly selected, will soon find a mountain of work for his activities.

One thing that must be done, is the establishment of uniform registration in all states. A registration that will require certain specific information regarding cars that will be of the greatest use in tracing a stolen car. The National Automobile Dealers' Association and some other organizations already are working along this line and the manufacturers should get behind this movement. A well conducted registration of all vehicles will be of great benefit in tracing cars that may be stolen.

Manufacturers also can keep a record of engine and

other car numbers. The Overland cars now are registered at the factory in this way. This is accomplished by the adding of 8 per cent to the price of each car, which the distributer and dealer must pay. When the dealer turns in the complete record of that car, together with the owner's name and address, he receives the $5 from the record department. As a result the Overland factory is able to quickly trace the ownership of cars that are regarded as under suspicious ownership. There is no single agency so effective in car theft prosecutions as the prompt identification of the car ownership.

Also it is a well established fact that laws do not enforce themselves. There must be some special agency to carry out their terms. In the case of prohibition, a special operative force is being built up. Car stealing will hardly get that attention from the government. There must be some pressure to see that the various district attorneys look after the car theft cases. The N. A. D. A. has been active in this work under the state laws. If each manufacturer would persistently follow the theft cases in which his cars were involved and offer encouragement where it was needed, the enforcement of the law will be more effective.

Perhaps it is in last mentioned phase of the work that the automotive manufacturer can be the most effective. A good many laws become non-effective because no one puts the right force behind them. This is true with regard to the motor theft cases under the various state laws. Unfortunately it is quite a burden upon any person to follow the prosecution of a case, and to keep the proper spirit behind the prosecution. The average citizen does not understand the reason for delays and he soon begins to feel that "something is being put over" on him. If the spirit behind the prosecutions is properly supported, the law will become effective. If that spirit is not maintained, it will not be more effective than the state laws now on the 49 statute books. The field for the manufacturer is clear. He must work with the various dealer and owner associations and supply the morale to keep the movement alive.

Front Brakes in Europe

ACCORDING to the report of our Paris correspondent concerning the Paris Show, the front wheel brake seems to be gaining in popularity abroad. This is a feature that has been exploited with considerable success by various British and French manufacturers but has not been adopted by an American maker. It is a rather expensive construction and scarcely would be used on any but strictly high grade cars.

The front brake may be regarded from two points of view. It may be used in conjunction with rear brakes, in which case it makes the weight of the whole chassis available for brake adherence. There is then less danger of the wheels being locked by the brakes, which is always very destructive to tires and, of course, the car can be brought to a stop in a shorter distance. On the whole, if both sets of brakes are used simultaneously, the strains due to breaking are reduced and trouble is much less likely to be experienced from overheating of the brake bands.

What makes the front brake specially attractive, however, is its anti-skidding quality. Every automobile driver is familiar with the fact that the application of the rear brakes while the car is proceeding over a slippery road, and especially when running down hill, tends to cause skidding. The reason is that on a greasy road surface the wheels are easily locked by the brakes, and locked wheels move as easily sideways as in any other direction.

When the front wheels are locked there is no skidding, because the rear wheels have a steadying action similar to that of the tail of an airplane. On the other hand, when the rear wheels are locked it requires only a slight dislocation of the center of resistance to start the car skidding. The propulsive effort, whether due to the torque on the rear wheels or to the momentum of the car, is generally centered around the axis of the chassis, and as long as the center of resistance coincides with it everything goes well. But let one of the front wheels strike an obstruction of any consequence, so as to unbalance the resistance, and a skid is started.

From a safety standpoint the front wheel brake is certainly a desirable feature.

Tractor Engine Governors and Safety

THE majority of truck and tractor engines are fitted with speed governors because these engines are designed for operation at low speed and much injury can be done by "racing" them. Tractor engines, moreover, if they have no governor, are apt to be operated "all out" all of the time and, while an engine for this class of work should be designed sufficiently staunchly to withstand that sort of treatment, it naturally adds to the life of the engine if the load is limited by a governor.

There is, however, another reason why every manufacturer of tractors should fit a governor limiting the speed of his engine. There have been in the past a number of accidents where farm tractors have turned over backward and seriously injured or even killed their drivers. Some of the farm papers have seized upon accidents of this kind for the purpose of creating distrust and prejudice against certain makes of tractors. It is a fact that farm tractors overturn most readily when not pulling any load, as the moment of the draw bar pull with the usual location of the hitching point tends to keep the front wheels down. The usual cause for overturning is some obstruction in front of the driving wheels which it is difficult to surmount in the usual way. Drivers of tractors without a governor are then inclined to resort to a dangerous practice. They will disengage the clutch, speed the engine to the limit and then suddenly jam in the clutch. The energy stored up in the flywheel thus enables them to apply for a moment a power greatly in excess of the normal engine power and, provided the transmission does not break, one of two things will happen: Either the tractor will surmount the obstacle or turn over.

TRUCK MAKERS EXPECT LARGE SALES IN 1920

Selling Campaigns to Open at January Shows in New York and Chicago

NEW YORK, Nov. 1—That truck makers are looking forward to 1920 as the big truck year and are making preparations to open their selling campaigns at the New York truck show, which is to be held in the Eighth Coast Artillery Armory, Jan. 3 to 10, is indicated by the unprecedented demand for space. Manager S. A. Miles has announced that there will not be an inch of the 150,000 sq. ft. of floor space unoccupied when the show opens.

Unusual interest also is being shown in the big transportation conference that will be a part of the show. It will be held in the auditorium of the armory and the wide interest it has created is indicated in the information that is being asked by factory heads, traffic managers, shippers, salesmen and dealers in various parts of the country.

A complete presentation of the motor transportation problem will be given by men of recognized qualifications. The subjects will include merchandising of motor trucks, service from every angle, operating costs, proven sales methods, etc. Motion pictures and lantern slides will be used to illustrate several of the talks. The sessions will be held in the afternoon and evening each day of the show.

The motor truck conference will be repeated at the National Motor Truck show in Chicago, which follows the New York show.

Franklin Production Nears 18,000 Mark

SYRACUSE, N. Y., Nov. 1—For the second month in succession, the Franklin Automobile Co. in September exceeded the schedule which is to bring the production of Franklin cars up to 18,000 for the current year. A total of 964 cars were scheduled for production that month and the factory report shows 1,004 delivered to the sales department. Production in October shows a further gain over September and at that, the overdemand for the Franklin cars is still 2,700 cars ahead of manufacture.

Martin Bombers for Air Mail Service

WASHINGTON, Nov. 4—Several big twin motored Martin bombing planes are soon to be put into operation by the aerial mail service on the New York-Cleveland-Chicago route.

These giant planes, adapted to the needs of the mail service, have been undergoing tests at Cleveland for some time. Several of the big planes are being assembled at the New Jersey air mail field near Newark.

A number of aerial mail officials left Washington yesterday for Cleveland to make final examinations and tests of the big planes before they are finally accepted for the use of the mail service.

The big Martin planes, which will be used over the mountain country, will carry about one ton of mail each trip at a speed of approximately 90 m. p. h. The Martin plane was selected because of its dependability of performance under all weather conditions.

Each plane will carry a crew of three and will be equipped with wireless or radiophone. It will carry two Liberty 400 h. p. motors.

Publication of this issue of Automotive Industries has been delayed until Dec. 5 by contions over which the publishers have had no control. Further issues will be forthcoming as rapidly as they can be printed.

New York Dealers in Drive For Members

NEW YORK, Nov. 2—The Automobile Dealers' Association of New York, whose membership has been increased from 60 to 247 since early summer, has announced a membership contest which it is hoped will bring the roster up to 700.

With the slogan "Every Member Is Expected to Bring in at Least One New Member," the association is offering an inducement to membership seeking on a large scale by putting up $1,000 in prizes. The member proposing the greatest number of new members will receive $350. The second prize is $200, third prize $100, fourth $75, fifth $60, sixth $50, seventh $40 and eighth $25.

Memberships for the purpose of the contest are classified as follows: For securing a dealer member 200 points, associate member 150, house member 50, non-resident member 25 points.

The contest will start tomorrow and end Dec. 6, and members enrolled during the period will be paid up by one year's membership fee to Dec. 31, 1920.

Commercial Value of Curtiss "Eagle" Shown

NEW YORK, Oct. 31—To demonstrate the practicability of the two new commercial land planes—the Eagle, eight-passenger, and the Oriole, three-passenger sportsman's model, the Curtiss Aeroplane and Motor Corp. recently sent a fleet of these ships in flight to Philadelphia, Baltimore and Washington.

The trip to Philadelphia was without incident and aeronautic experts have pronounced the planes admirably adapted to fill the requirements of commercial aviation.

In Washington the machines gave demonstration flights to government officials and representatives of foreign governments.

ASSOCIATION PLANNED TO BOOST AIR SERVICE

Airway Organization to Develop Passenger and Commercial Accomodations

KANSAS CITY, Nov. 3 — Tentative organization of a "National Airways Association" was effected in Kansas City Oct. 30, at a convention called by the Associated Highways of America.

The following committee to effect a temporary organization and to set the time and place for the convention to organize permanently, was appointed: E. C. Bracken, Paris, Texas; O. M. Phelps, Huron, S. D.; H. A. Russell, Fort Scott, Kan.; Frank A. Davis, Kansas City, Mo.; A. Q. Miller, Belleville, Kan.; J. J. Moriarty, Shakopee, Minn.; Wesley Connett, St. Joseph, Mo.

The committee elected Bracken, chairman, Davis, secretary. Bracken is secretary of the Chamber of Commerce at Paris, Tex., and Davis is secretary of the Associated Highways of America.

The convention was presided over by C. F. Adams, president of the Associated Highways of America, a motor car dealer of Chillicothe, Mo. There were 25 delegates present, most of them representing various highway associations, but all having credentials from Chambers of Commerce, or from departments of the United States government.

The purposes of the convention and the new organization is to promote a systematic development of accommodations for air travel—both plane and lighter-than-air machines.

The delegates reported keen interest in air travel among local business men. The reflection being of sentiment in smaller towns, since large cities—except in the case of Kansas City—were not represented. Local merchants expect that air travel and shipment of merchandise —especially machine parts—will have a pronounced effect on their business by developing landing fields and facilities for supplying and repairing air machines, the communities expect to secure a beneficial effect, and avoid loss of tourist and business travel.

The majority of persons present foresaw a tremendous volume of air business within a year or eighteen months, mostly passenger, an immediate large business in carrying machine parts and, ultimately, express and freight business.

The association hopes to be useful in promoting the establishment of suitably equipped landing fields, and the establishment of air routes. Its functions will be largely for air travel and express business.

Government representatives present offered co-operation, and gave useful suggestions as to avenues of activity through which the Airways Association could promote mail routes and other air lines. Persons representing manufacturers of air machines, and those planning air routes for passenger and express, were interested visitors.

Automotive Exports Reach High Level in September

1919—	Cars	Value	Trucks	Value	Parts
September	6,383	$6,838,439	1,359	$3,369,581	$4,560,273
August	6,283	6,855,277	1,250	2,537,812	3,193,431
1918—					
September	2,555	2,593,236	1,284	3,233,206	3,441,758

WASHINGTON, Nov. 1—Automotive exports for September continued on the increase and, as a whole, showed stimulating gains over the month of August, the greatest impetus having come in the shipments of trucks and parts. Passenger car exports were little changed from those of the previous month, as the figures for September showed that a total of 6,383 cars with a value of $6,838,439 had been sent to foreign countries, the value being slightly less than that for August.

The upward curve of the trade registered its greatest swing in the value of the equipment exported, this reaching the surprising total of $4,560,273, or a gain of more than 1¼ millions over the August sales. Trucks likewise were on the upgrade and the valuation of $3,369,581 was three quarters of a million and more higher than for the preceding total.

In the latter movement, France took the larger share, the value of the 365 trucks shipped there approximating in value one-half of the total exports. No other country, of course, approached the French takings in this field and Canada, with a total value of trucks received at $318,866, was the only other country that received any appreciable number of such machines.

The lifting of the import ban in the United Kingdom was marked by a doubling of the passenger cars importations from this country. The August totals showed that no more than 404 cars were sent to Great Britain during that period. But September, with the ban removed, absorbed 980 cars with a valuation of $955,150 and was by far the largest buyer of American cars.

Exports of Automotive Equipment for September and Nine Months Ending September, 1919

	1918		1919		1918		1919	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes	13	$ 197,700	21	$ 44,700	28	$ 417,455	32	$ 130,200
Airplane Parts	....	1,111,607	.....	47,054	.....	10,371,948	.....	3,140,412
Commercial Cars	1,284	3,233,206	1,359	3,369,581	7,701	19,276,345	11,034	26,676,945
Motorcycles	420	93,775	1,717	492,829	7,448	1,732,468	15,996	4,341,281
Passenger Cars	2,555	2,593,236	6,383	6,838,439	31,298	29,616,551	44,291	48,823,761
Parts, not including engines and tires	....	3,441,758	.....	4,560,273	.....	25,548,133	.....	30,394,013

	1918		1919		1918		1919	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobile, gas	1,273	$ 231,725	4,392	$ 643,653	23,024	$ 3,081,984	23,047	$ 3,572,202
Marine, gas	435	153,973	596	238,586	4,049	2,002,369	8,653	3,710,321
Stationary, gas	2,200	271,538	3,448	390,905	20,769	2,489,270	19,771	2,861,822
Tractor, gas	2,339	2,754,360	1,642	1,489,688	19,727	20,598,052	16,258	16,255,023
Total	6,247	$3,411,596	10,078	$2,762,832	67,569	$28,171,675	67,729	$26,399,368

Exports by Countries for September and Nine Months Ending September, 1919

	Cars		Trucks		Cars		Trucks	
	No.	Value	No.	Value	No.	Value	No.	Value
Denmark	296	$ 369,513	.....	.....	1,968	$ 2,291,991	.....	.....
France	92	127,465	365	$1,786,414	512	1,538,984	2,936	$12,873,725
Norway	153	175,135	.....	.....	1,242	1,532,095	.....	.....
Russia in Europe	1	580	.....	.....	2	1,180	.....	.....
Spain	101	108,137	.....	.....	913	1,058,476	.....	.....
United Kingdom	980	894,552	9	12,888	2,449	2,550,887	80	153,085
Canada	793	955,150	195	318,866	6,599	6,768,983	1,442	2,206,871
Mexico	213	135,355	.....	.....	.....	.....	1,999	1,593,567
Cuba	190	209,819	40	78,211	1,695	1,968,346	574	1,243,273
Argentine	209	250,888	37	68,386	1,516	1,922,036	136	263,433
Chile	22	28,410	.....	.....	416	639,293	.....	.....
Uruguay	62	61,274	.....	.....	1,246	1,236,720	.....	.....
British India	261	289,207	.....	.....	1,421	1,585,594	.....	.....
Dutch East Indies	3	4,774	.....	.....	1,525	1,984,872	.....	.....
Russia in Asia	....	.....	.....	.....	49	52,145	5	5,050
Australia	376	427,677	.....	.....	2,532	2,599,513	.....	.....
New Zealand	231	239,193	.....	.....	1,959	2,147,584	.....	.....
Philippine Islands	222	209,150	.....	.....	1,918	2,140,136	.....	.....
British South Africa	281	290,825	.....	.....	1,818	2,129,288	.....	.....
Other countries	1,397	2,061,335	713	1,104,816	12,512	13,082,071	5,861	9,931,508
Total	6,393	$6,838,439	1,359	$3,369,581	44,291	$48,823,761	11,034	$26,676,945

1920 Road Projects Total $633,000,000

WASHINGTON, Nov. 5—It is expected that $633,000,000 will be expended for hard surface highways in 1920, as compared with $138,000,000 this year, as both of these figures constitute new records. The 1920 expenditures include: Brought forwards from unfinished work, 1919 contracts, $165,000,000, funds available from state and county taxes and Federal aid, $273,000,000; one-fifth state and county bond issues not before available, $50,000,000; one-third unexpended balance of state and county bond issues previously available, $45,000,000; available from new bond issues to be voted on in the fall of 1919 and spring of 1920, $100,000,000.

It is believed that unless open top freight cars are used this next winter during the period when they usually lie idle it will not be possible to secure the necessary road materials and consequently, according to Thomas H. MacDonald, Chief of the Bureau of Public Roads, all state, county and city road-building interests should be directed toward overcoming this car shortage. To this end it is recommended that shipping of materials begin earlier than usual and that contracts should be awarded as early as possible.

Studebaker Corp. Plans $45,000,000 Expansion

DETROIT, Nov. 1—Stockholders of the Studebaker Corp. will vote on the plan to increase the common stock of the company from $30,000,000 to $75,000,000 and retire $15,000,000 7 per cent serial gold bond notes at a special meeting to be held in South Bend, Ind., Nov. 24. The directors of the company meet this week to act on dividend disbursement and it is reported the rate will be increased from 4 to 7 per cent.

The new stock plan contemplates offering 150,000 shares to stockholders of record Nov. 29 at $105 a share and to issue subscription warrants to cover such rights, which are to be exercised not later than Dec. 13. Sale of new stock will provide funds for retiring the notes.

Variety of Makes for Cleveland Show

CLEVELAND, Nov. 6 — Forty-six makes of cars are included in the list of applicants for space in the 1920 Cleveland Automobile Show in Wigmore Coliseum Jan. 17-24.

The show management has decided on an important departure and this coming event will have on exhibition steam, electric and gasoline propelled vehicles. The Cleveland show is one of the few in the country to embrace every type of propulsion, according to the management.

Men in charge of the show estimate that the applications already on file will exhaust the entire available space, although many thousands of additional feet have been obtained for the 1920 exhibit. New floor plans are being worked out for the convenience of exhibitors and guests.

NEW AIR PROPOSAL BEFORE CONGRESS

Separate Army and Navy Air Forces Provided—Other Important Changes

WASHINGTON, Nov. 3—A new bill has been introduced in Congress by Senator Harry S. New, for the establishment of a Department of Aeronautics, providing for the organization and administration of the United States air forces and for the development of commercial aviation. The bill is similar to Senator New's bill introduced in October, except that it provides for a department of aeronautics in place of a department of air, increases the salary of the director from $10,000 to $12,000, and would, in addition to creating United States air forces, also have an air force for the Army and an air force for the Navy, each to be operated by the Army and Navy respectively. This bill has been introduced by the Senator in the hope of winning over the Army and Navy officials who have opposed his original bill.

Under the new bill there would be the establishment of a department of aeronautics with an air academy, which would train pilots, an air force which would have charge of the defense of the air and other bureaus which would have complete charge of all aviation in this country, except those aviators directly assigned to the Army and Navy. This bill, as with the previous one, is devoted chiefly to provisions for the establishment of large numbers of military officials, including major generals and other officers, who would control the air force that would be separate from either the Army or Navy.

Army and Navy Will Seek Helium Sources

WASHINGTON, Nov. 1—A joint Army and Navy Board has been created "for the purpose of co-ordinating the various helium gas activities and requirements of the various Government Bureaus, including full control over the operation of the present and future Government owned helium production plants, disposition of helium products, the conduct or supervision of conduct of further experiments undertaken with a view toward increasing the efficiency of the production plants and to control further steps for conserving such sources of helium as may be deemed expedient."

Col. C. DeF. Chandler, Air Service, Chief, Balloon and Airship Division, is chairman of the board, with Major P. Pleiss, Air Service, as alternate. Commander A. K. Atkins, U. S. N., is a member with Commander H. T. Dyer as alternate. Because of the fact that so many of the problems in connection with helium gas concerns the Department of the Interior, the Bureau of Mines of the Department has been invited to have a representative meet with the board. Dr. F. C. Cottrell, assistant director of the Bureau of Mines, has been named as representative, with Dr. R. B. Moore, Chief Chemist of the Bureau of Mines, as alternate.

At the meeting of the helium board held Oct. 23, it was decided to have an extensive exploration program carried out in order to locate all sources of helium gas in the United States. The details of the program will be under the direction of the Bureau of Mines and will be carried out by a field force visiting all localities suspected of having helium gas possibilities. It is estimated that approximately a year and a half will be required to analyze all gases suspected of bearing a workable amount of helium. The present helium laboratory at Fort Worth, Tex., will be enlarged to handle the test of all gas samples sent to the laboratory. Doctor Seibel, one of the first scientists to discover helium in workable quantities in natural gas, is in charge of the analytical work at the laboratory. It is aimed to secure the full co-operation of all oil and natural gas production companies in the United States to the extent of their sending in to the laboratory samples of their gas. Considerable work has already been accomplished on estimating the extent of our helium resources but the present program will be in the nature of a complete inventory.

Bill Provides for Sale of Gas on U. S. Fields

WASHINGTON, Nov. 1—A bill has been introduced in Congress which authorizes the War Department to sell gasoline, oil and aircraft supplies to civilian aviators at the contract price plus 10 per cent when they land near aviation fields and are in need of assistance for the continuation of their journey or for the protection of the passengers or crew. The provision in the bill is to the effect that only limited amounts are to be sold, the limit being the quantity necessary to enable the aviator to reach the nearest point where he can purchase supplies.

SWISS AIR POSTAL SERVICE

WASHINGTON, Nov. 5—An aerial passenger and postal service has been established between Geneva, Lausanne, Berne and Zurich, Switzerland, according to a commerce report, commencing Sept. 1, 1919, the following schedules were observed:

Leaving Zurich at 10 a. m.; Berne, 11:05 a. m.; Lausanne, 12:05 p. m., and arriving at Geneva 12:40 p. m.

Leaving Geneva at 2 p. m.; Lausanne, 2:40 p. m.; Berne, 3:35 p. m., and arriving at Zurich 4:30 p. m.

The cost of a ticket from Geneva to Zurich and return is 500 francs ($96.50), and for a ticket to Berne and return, 300 francs ($57.90).

A postal service also is maintained. In addition to the regular postal charge, a special 50-centimes (10-cent) stamp must be affixed to each letter. Small packages, weighing up to 12 lbs. are carried at the rate of 50 centimes (10 cents) for each half pound.

Senate Pleads for U. S. Air Department

WASHINGTON, Oct. 29—A demand for a separate department of aeronautics to save the aviation industry in this country and insure aeronautic progress and advance was made yesterday by Senator Wadsworth of New York, chairman of the Military Affairs Committee when he protested against the elimination of the appropriation for $15,000,000 for military aeronautics as made by the conference committee. Senator Wadsworth claimed that this country could not send three squadrons of airplanes into battle at this time if they were needed, and Senator Thomas declared that, unless Congress awakens to the need for the development of aeronautics, the United States will find itself inferior in the air service to Mexico.

"The regular appropriation of $25,000,000 is insufficient," Senator Wadsworth said. "The British and French Governments have created new government departments of air service. They recognize that aviation has a tremendous commercial value, that it is new department of transportation, as important in its element as in maritime transportation in another element. It is absolutely necessary that Congress establish a separate department in charge of aviation.

"Before the armistice, although it is true there had been great waste, we had nevertheless established a huge industry and were at a very high point of production of planes and engines. Immediately all contracts were cancelled, establishments closed and nothing has been done since to keep this producing capacity organized. Congress has not appropriated the money necessary to keep plants running. Why, in July of this year just fourteen airplanes were made in the whole United States, while in the same month Great Britain produced 2,000. That shows how we are standing still while others are going ahead.

"There has been extravagance and waste but it should be said that responsible men are now in charge. The men who perpetrated the extravagances and waste have been retired. We have all confidence in the present Director of Air Service and his lieutenants."

BRITISH TRACTOR TRIALS.

LONDON, Oct. 17—The announcement of another independent tractor trial next year, organized by the Society of Motor Manufacturers and Traders, is expected within a few days.

The recent event at Lincoln appears to have been most successful and has resulted in good business and many entrants. If the Royal Agricultural Society holds its proposed trial, there will be two of these events next year.

DORR MILLER CO. SOLD.

CLEVELAND, Nov. 7—The Forest City Machine & Forge Co. has acquired the plant of the Dorr Miller Differential Co., with exclusive license to manufacture and sell the Dorr Miller differential.

MASS PRODUCTION OF LAFAYETTES SOON

First Cars in February, 1920—3,000 Yearly Output Planned

INDIANAPOLIS, Nov. 1—The Lafayette Motors Co. will start production on its new car Feb. 1, the plans contemplating an output of from five to 15 cars a day at the outset. An annual output of 3,000 is the goal set by Pres. Charles W. Nash. Additions to the already large plant are in contemplation to take care of the increased production. Several buildings which were used in war work will be remodeled and put into use. The new car is ready for the road test and will be on exhibition at the winter shows.

D. McCall White, vice president and former vice president of the Cadillac company, declares the new car will be far ahead of any previous automobile built under his supervision. Many orders already have been booked on the strength of the reputation of the Lafayette officials for high class motor production.

DURANT ENTERS FILM BUSINESS

DETROIT, Nov. 1—William C. Durant, president of General Motors Corp., has branched out as a movie "star," although his efforts will be confined strictly to the business end. Durant has been made a director of the corporation which has taken over the Loew theaters and theatrical interests in the United States. Durant's name heads the list of directors of the new corporation which includes some of the leading financiers of the nation.

PACKARD CHANGES STOCK PAR

DETROIT, Nov. 3—At the adjourned stockholders' meeting of the Packard Motor Car Co., held recently, it was decided to reduce the par value of the company's common shares from $100 to $10. The directors were authorized to make arrangements for the issue of ten shares of $10 par value in exchange for each present share of $100 par value.

CONROY JOINS BRITISH PLANT

LONDON, Oct. 17—(Special Correspondence)—T. Conroy, formerly superintendent of equipment and tools to the Willys-Overland Co., has been appointed to a similar post by A. Harper Sons & Bean, Ltd., an old established large firm of engineers with plants at and near Birmingham, which has gone in for mass car production. Conroy should have a fine scope with this company, as their motor department being entirely new is being equipped with new tools, the vast majority of them being American.

NASH OPENS BRITISH AGENCY

KENOSHA, WIS., Nov. 3—The Nash Motors Co., Kenosha, Wis., has concluded arrangements with Charles Jarrots & Letts, Ltd., London, Eng., for the distribution of the Nash line in the British Isles. W. M. Letts, managing director of the English concern, visited the Kenosha factories last week. He also is managing director of the Crossley Motor Works, Ltd., of Manchester, Eng. At the time of Mr. Letts' visit to the Nash plant, it also was entertaining T. G. Russell, president of Nash Motors, Ltd., Christ Church, New Zealand.

More Factory Extensions for A. O. Smith Corp.

MILWAUKEE, WIS., Nov. 3—The A. O. Smith Corp., Milwaukee, which recently broke ground for a large shop addition, 275x740 ft. in size, will begin work during the coming week on the second of the series of shop extensions which will be made during the year at an estimated cost of $3,450,000. The second unit will be 360x850 ft., part six stories and the remainder two stories high. It will cost $1,250,000 complete. The addition now under way will be ready by Dec. 15 and cost $800,000. A third unit will be erected early in the spring and a fourth during the summer. The project will make the Smith corporation probably the largest manufacturers of pressed steel frames, and forged and stamped parts.

BIG NELSON TRUCK OUTPUT

SAGINAW, MICH., Nov. 1—Nelson Motor Truck Co., manufacturers of the Jumbo truck, announces an increase in production capacity which contemplates an output of 2,000 trucks in 1920. Three additional units to the factory, 72x180 ft. are under way.

Cadillac Plant for Milwaukee, Is Rumor

MILWAUKEE, WIS., Nov. 3—It is reported on excellent authority that the Cadillac Motor Car Co., Detroit, will erect an assembling plant costing in the neighborhood of $250,000 for the first unit, in Milwaukee. Architects Kirchoff & Rose, Majestic Building, are preparing plans for a three-story brick and reinforced concrete building, 121x250 ft., to be located in North Avenue and Bartlett Street. Bids will be received about Nov. 17, so that the structure may be ready for occupancy shortly after Jan. 1.

RELIANCE TIRE ORGANIZED

WADSWORTH, OHIO—The Reliance Tire & Rubber Co., has been chartered with a capital of $300,000 to manufacture automobile tires and tubes.

LARGE SALES IN INDIA

WASHINGTON, Oct. 31—There are large sales of American motor cars in India, according to a report by the Calcutta consul. Seven hundred and fifty were imported from the United States during the month of August at a value of $632,645.

OPENS EXPORT OFFICE

NEW YORK, Nov. 7—The Napoleon Motor Co. of Traverse City, Mich., has opened an export office here at 100 Broad Street. The office will be in the direct charge of the American Motors Co. The export business of this company is growing rapidly.

Austin Whippet, a One-Man Civilian Airplane

One of the first concerns to announce a small airplane for private use is the British Austin Co. The "Austin Whippet" measures from stem to stern 16 ft., and has a wing span of 21½ ft. Its fuselage and landing gear are constructed of steel and stream-lined steel tubes take the place of bracing wires, thus doing away with the necessity of frequent re-rigging. A six-cylinder Anzani engine of 45-50 h. p. is fitted. The "Whippet" climbs 5,000 ft. in 8 minutes and 10,000 ft. in 18 minutes. It has a speed of 85 m. p. h., which can be reduced on landing to 30 m. p. h., an attribute which commends it for civilian use.

An arrangement for folding the wings enables the "Whippet" to be stored in a building 18 ft. long, 9 ft. wide and 8 ft. high. One man can fold the wings back to the side of the plane after unfastening four locking bolts, which hold the wings in position for flight value.

The company expects to sell the machine for $2250.

WILLYS INTERESTS BUY CONTROL OF REPUBLIC

Determination to Embark Extensively in Commercial Vehicle Field Seen

DETROIT, Nov. 4—Purchase by John N. Willys, of the Willys Overland, of a controlling interest in the Republic Truck Co., of Alma, Mich., created much comment in the trade, indicating a determination on the part of the Willys interests to embark extensively in the commercial vehicle end of the automobile industry.

The Republic is the largest exclusive truck manufacturer in the world. It is capitalized at $1,000,000, besides which it has 100,000 shares of common stock of no par value outstanding. The company was organized in 1913 and has a factory containing 500,000 sq. ft. of floor space.

The company has put 60,000 trucks on the market. It is now producing trucks at the rate of 1,200 a month. Willys has for some time owned a controlling interest in the Garford Truck Co., an Ohio concern.

Program Arranged For the Nashville Show

NASHVILLE, TENN., Nov. 1—The first week of the Nashville automobile show, which opens on Feb. 9, under the auspices of the Nashville Automobile Trade Association, will be devoted entirely to passenger cars and equipment, while the second week will feature trucks, tractors and farming implements.

The arrangements for the show are being handled by Lawrence M. Hirsig, chairman of the show committee. Hirsig is connected with the Hirsig Auto Supply Co., 903 Broadway, Nashville.

1,000 Coleman Tractors Planned for Next Year

KANSAS CITY, MO., Nov. 4—The Coleman Tractor Co. has let a contract for the immediate erection of an assembly building. The assembling heretofore has been done in the machine shop. Production the coming year will be about 1,000 machines.

New Product Keeps Moisture Off Lenses

CHARLESTON, S. C., Nov. 5—"Crystal-On," a new liquid chemical prepared by Lieut. W. B. Atwater, Naval aviator on duty in the Sixth (Charleston) Naval district, was given a practical test recently by Ensign J. E. Wolfe, proving its value as a preventive of accidents to aircraft and automobiles, when Wolfe flew in a rainstorm from Brunswick, Ga., to Charleston, S. C., a distance of about 100 miles. Before leaving Brunswick, Ensign Wolfe applied some of the new chemical to his goggles. The seaplane soon ran into a heavy downpour of rain. In such weather aviators usually descend, but Ensign Wolfe found that "Crystal-On" did its work so well that the rain and moisture were repelled and his vision remaining unimpaired, he continued on through the rain storm.

Naval officers believe that "Crystal-On" will prevent many accidents in the air and to automobiles and motor boats by keeping glasses clear of moisture and the vision of pilots, chauffeurs and navigators unobstructed, whether they are driving through a mist or a genuine rain storm. Lieutenant Atwater is organizing a company capitalized at $200,000 for the manufacture of this chemical and in the near future a plant will be erected here.

Transit Charges On Parcel Post

WASHINGTON, Oct. 28—Parcel post packages addressed to the foreign countries and colonies to which there is a parcel post service are subject to a postage charge of 12 cents a pound or fraction of a pound, and to certain places there is a transit charge which must be prepaid in addition by means of postage stamps affixed to the parcels. Postmasters have been requested to give this matter of transit charges special attention and for their guidance there has been prepared the following table of charges for ready reference thereto in case of need:

Destination	Transit charge for parcels not exceeding: 3 lb.	7 lb.	11 lb.
Algeria	$0.20	$0.20	$0.20
Belearic Islands	.05	.05	.05
Belgian Congo	.20	.20	.20
British East Africa	.36	.72	1.08
Egypt	.24	.42	.60
Canary Islands	.10	.10	.10
Corsica	.20	.20	.20
India (British and French)	.24	.48	.72
Malta	.24	.48	.72
Mesopotamia	.24	.48	.72
Morocco (Spanish)	.05	.05	.05
Palestine	.46	.62	.78
Paraguay	.30	.30	.30
Sudan (Egyptian)	.24	.42	.60
Syria	.56	.72	.88
Tunis	.35	.35	.35
Uganda	.36	.72	1.08
Zanzibar and Pemba	.36	.72	1.08

Parcels for certain places in Tibet, Persia and on the Persian Gulf are mailable at the same rates as parcels for India.

American Trade Cars In Big Demand Abroad

DETROIT, Nov. 1—The demand for American cars in Europe is increasing every day and appeals from foreign distributers are being received constantly by the export department of the factories in Detroit and other centers of the industry. The General Motors Corp. has been besieged with orders for cars manufactured in plants controlled by the company. A cablegram received a few days ago contained a plea for an increase from the 2,000 allotment to 5,000 in 1920 from the Scripps-Booth distributer in one of the European countries. Manufacturers, however, will make no effort to take on new export business until the strike clouds clear away.

POOR CROP MAY AFFECT TRACTORS

Uncertainty of Yield Causes Doubt as to Winter and Spring Demand

KANSAS CITY, MO., Nov. 3—Tractor distributers here are in doubt as to the prospective sales of tractors this winter and next year. Two elements of the situation are depressing.

Not more than 60 per cent of last year's wheat area is being sown this fall; the condition of the sown wheat is not satisfactory. Under these circumstances, dealers hesitate to place orders; and they cannot make much headway trying to get farmers' contracts.

The uncertainty as to how the sown wheat will get through the winter renders uncertain two things:

1. The prospect for sale of harvesting equipment.

2. The prospective sale of spring-planted crop-sowing equipment.

It is possible that much of the wheat land now sown will be planted to corn in the spring—probably with listers, which is the practice in this country. A few dealers in this territory are getting winter orders and are ordering tractors shipped in February and later. The chief activity at this time is in Oklahoma.

Distributers are exerting themselves to arouse dealers to the necessity of winter ordering; but they have an uphill job.

Wheat Growth

The rank growth of wheat the past season has complicated the outlook for sales in this territory by producing a comparatively large area of volunteer wheat. Farmers are divided in opinion as to how to handle this growth. The rank straw last summer caused much wheat to fall and this was passed over by the cutters. Wheat has sprung up in a solid mass—perhaps this will be too thick for good growth and maturing and whole fields may be plowed under in the spring. Some farmers are cultivating the volunteer fields with teams or tractors by plowing furrows to divide the masses and to reduce the drain on the soil elements.

The 40 per cent reduction in wheat acreage in this section and the prospect that a larger-than-usual proportion of the planted wheat area will be turned to row crops in the spring, offers an especially significant opportunity to tractor-drawn implement dealers.

The territory is now at the turning point in its practice of handling spring-sown crops, turning to more thorough cultivation of the soil in the spring, which involves a more general use of tractors at that season. Heretofore most corn has been planted with listers—the listing farmer being the poorest kind of a tractor prospect.

Safety Council Forms Engineering Section

CHICAGO, Nov. 3—The formation of an engineering section of the National Safety Council has been authorized by the executive committee of the council and the new section will be organized immediately by a special committee appointed for the purpose.

In announcing this action, Sidney J. Williams, secretary and chief engineer of the National Safety Council said the decision to form a distinct engineering section was prompted by three things:

First, the growing recognition of the importance of the engineering factor in safety work;

Second, the growing interest in safety work on the part of civil, mechanical, electrical, mining and chemical engineers;

Third, the growing volume of experience and investigation in the engineering problems involved in safety work.

"The formation of an engineering section," Mr. William said, "will provide a vehicle for concentration of the engineering brains of the several thousand member companies of the council on the solution of engineering problems affecting safety work in large groups of industries, in specific industries and in industry generally.

"The development of the council has been largely along the line of industrial sections. The council now has nineteen sections, each with its own officers and program and each interested largely in the safety problems of its own particular fields. These sections are as follows: Automotive, cement, chemical, construction, education, electric railway, health service, marine and navigation, metals, mining, packers, paper and pulp, public safety, public utilities, rubber, steam railroad, textile, women in industry and wood-working.

"The greatest contribution of the new engineering section will be with respect to problems that cut across the interests of several sections and affect whole groups of industries as, for instance, the hazards of poisonous dust or gas. The new engineering section will also facilitate contact and co-operation between the various national engineering societies, the engineering departments of the government and the National Safety Council."

AIR MAIL BILL IN CONGRESS

WASHINGTON, Nov. 6—A bill has been introduced into Congress which will authorize the Postmaster General to purchase airplanes and operate airplane mail routes between New York and San Francisco, and such additional points between these cities as he may regard as necessary.

General Motors Opens Bloomfield Plant

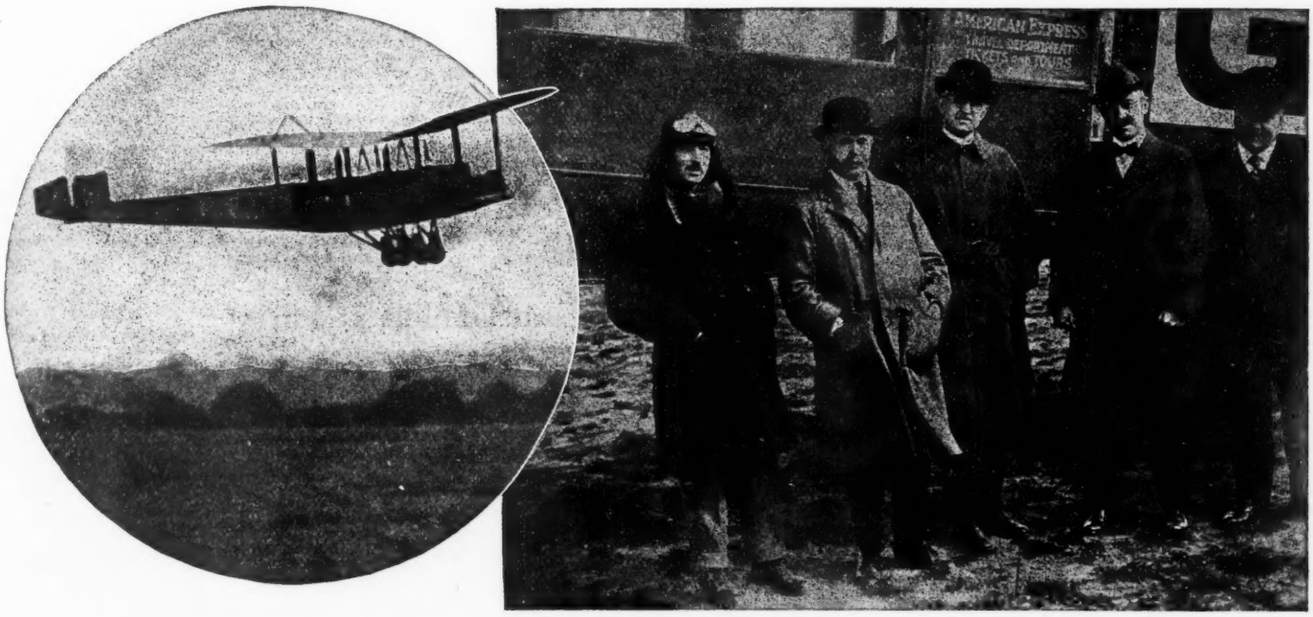
NEWARK, N. J., Nov. 3—The dismantling of the International Arms & Fuse Co. plant at Bloomfield, N. J., and the installation of machinery for the manufacture of automobiles by the General Motors Corp. are progressing rapidly. At the plant it was announced that the work of preparing the factory for production was being rushed to completion and that manufacturing would be started within a few weeks.

The International Arms & Fuse Co. developed the big plant, which extends nearly two blocks along Grove street, Bloomfield, for the manufacture of war materials and at the end of the war it was one of the largest munitions plants in Jersey. Negotiations for the purchase of the works, which have been in progress several weeks, were closed recently.

NEW PERRY TOP COMPANY

COLUMBUS, O., Nov. 3—D. N. Perry, former owner of the Perry Auto Top Co. of Columbus, has formed a new company for the manufacture of automobile tops and trimmings, under the name of D. N. Perry Co. His plant will be located at Fourth and Russell streets, where a building is being erected. Associated with him will be his son, H. W. Perry, who recently returned from army service in France.

London-Paris Passenger Plane



The London-Paris Air Service, for passengers and parcels, long since has reached the point where ordinary transportation agencies sell passage as an everyday occurrence.

The picture shows Captain S. P. Lea, the pilot; W. J. Thomas, vice-director general of the American Express Co., A. R. Green, manager travel department, Paris; F. P. Small, first vice-president and William Gourlay, manager of the London branch.

The air service has been highly successful since its inception, which has been in a measure due to the pioneer work of the American Express Co., the recognized agents for both passenger and parcel traffic across the Channel.

There are two distinct services, one at $75 by the Handley-Paige Co., whose machines carry 14 passengers, and the other at $95 by the Aircraft Transportation & Travel Co., whose machines carry six passengers. The latter machine has made the London-Paris trip in 1 hr., 50 min.

MOTOR VEHICLE THEFT LAW IS NOW IN FORCE

Bill Introduced by Representative Dyer Is Law Without President's Signature

WASHINGTON, D. C., Nov. 5—The text of the National Motor Vehicle Theft Bill, which was introduced by Representative Dyer, of St. Louis, and which has become a law without the signature of President Wilson, follows:

"Section One: Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that this act may be cited as the National Motor Vehicle Theft Act.

"Section Two: That when used in this Act: (a) the term 'motor vehicle' shall include an automobile, automobile truck, automobile wagon, motor cycle, or any other self-propelled vehicle not designed for running on rails; (b) The term 'interstate or foreign commerce' as used in this Act shall include transportation from one state, territory, or the District of Columbia, to another state, territory or the District of Columbia, or to a foreign country, or from a foreign country to any state, territory, or the District of Columbia.

"Section Three: That whoever shall transport or cause to be transported in interstate or foreign commerce a motor vehicle, knowing the same to have been stolen, shall be punished by a fine of not more than five thousand dollars ($5,000.00), or by imprisonment of not more than five years, or both.

"Section Four: That whoever shall, with the intent to deprive the owner of the possession thereof, received, conceal, store, barter, sell, or dispose of any motor vehicle, moving as, or which is a part of, or which constitutes interstate or foreign commerce, knowing the same to have been stolen, shall be punished by a fine of not more than five thousand dollars ($5,000.00), or by imprisonment of not more than five years, or both.

"Section Five: That any person violating this Act may be punished in any district in or through which such motor vehicle has been transported or removed by such offender."

MAXWELL-CHALMERS STOCK IN MERGER

DETROIT, Nov. 1—Stockholders of the Maxwell Motor Co., and the Chalmers Motor Corp., have been requested to deposit their securities with the Central Union Trust Co., New York, on or before Nov. 8, for the purpose of effecting a merger of the companies.

No information could be secured here officially as to the terms of the merger, but unofficially it is learned that the exchange of securities was recommended as follows: Chalmers mortgage notes to be converted into new preferred stock; Maxwell first preferred, 120 per cent of holdings, or 157,601 shares; Maxwell second preferred, 66½ per cent of holdings, or 67,348 shares; Maxwell common, 70 per cent of holdings or 89,637 shares; Chalmers preferred, 105 per cent of holdings, or 46,200 shares; Chalmers common, 15 per cent of holdings, or 59,905 shares; total, 420,691 shares.

The new capitalization will be $10,000,000, seven per cent, ten-year notes; $3,150,000 seven per cent preferred stock and 420,000 shares common.

Equipment Reserved for Vocational Work

WASHINGTON, Nov. 3—The Secretary of War has ordered that 900 passenger cars, 900 trucks and 900 motorcycles, are to be reserved from the stocks held by the War Department for vocational training purposes. The vehicles will be distributed by the Director of Purchase, Storage and Traffic, as follows:

To each of the seventeen divisional camps and to each of the overseas departments, thirty passenger cars, thirty trucks and thirty motorcycles, 1,800 vehicles in all.

So far as possible the distribution will include two-thirds of the non-standard and one-third of the standard vehicles. The non-standard types will be held in reserve by the Director of Purchases, Storage and Traffic for distribution to military posts in accordance with vocational needs as later determined.

320,000 Trucks Ready If Rail Men Strike

WASHINGTON, Nov. 4—The War Department has made an investigation through the Council of National Defense, of the available motor trucks which could be used in event of a railroad strike. A report was rendered to Secretary Baker today showing that there are available some 20,000 army trucks and about 300,000 others which the Government perhaps could obtain from private interests.

CUSTOMS BOARD SPECIFIES PARTS

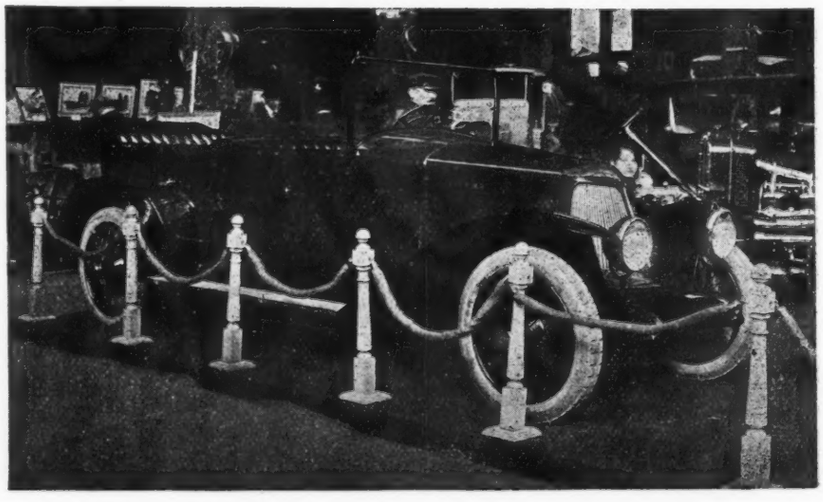
WASHINGTON, Oct. 28—The Canadian Board of Customs has rendered a decision specifying the articles that may be admitted into Canada as "complete parts" of farm traction engines and threshing machine separators at the reduced rates of duty provided for in the customs tariff, according to a recent commerce report. The rate under this item for imports from the United States is 17½ per cent ad valorem, while for imports from the United Kingdom and certain British possessions the duty is 12½ per cent.

Iron or steel parts not entitled to admission under this item will be classified as manufacturers of iron and steel not otherwise specified, the duty in that case being 37½ per cent ad valorem in the case of articles from the United States. The importer is required to make a special declaration that the parts are for the purposes indicated and will not be used for any other purpose.

The list of parts entitled to entry at the special reduced rates is as follows:

Air cleaners used on gas tractors; ball and roller bearings; die cast bearings; belts manufactured endless or joined by fasteners or lacing; (not including the belt connecting the engine and separator); and belting, brass cocks, cable sets for magnetos (complete with terminals); carburetors; brass connectors for connecting copper tubing; cut gears (made for this machinery), cylinder teeth; ejectors; emery rollers (used in the separator to automatically sharpen the straw-cutting knives); fans for radiators; fly wheels; gas engine poppet valves, governors; engine and feed governors (made especially for machines enumerated in tariff item 447); grain saving devices; grease cups, steel and brass; headlights for tractors; brass injectors; knives feeder fitted with shoe; straw knives; ledger plates; lock faucets (for locking the gas storage tanks on tractors); oil pumps or lubricators for engines; oil strainers, brass; magnetos; motor engine for tractors; name plates; piston rings; pulleys; radiators; safety valves; sieves (including adjustable sieve for grain separators); spark arrestors; spark plugs, special kerosene plugs; springs; sprockets; stacker pipe and parts for windstaker; steam gauges; steam pumps used on steam tractors; turnbuckles; brass valves; wheels for threshing-machine separators and tractors and whistles.

An Exhibit at Paris



Alda has moved the radiator to the front

OTTAWA HAS NEW AUTOMOTIVE BODY

All Branches of Industry Represented—Big Show Planned For January

OTTAWA, ONT., Oct. 30—The Automotive Trade Association of Ottawa was definitely organized recently at a large and enthusiastic meeting here of the allied trades. The attendance consisted of more than 35 men representing the automobile tire, accessory, tractor and aeroplane interests of the city and district.

The representatives were unanimous in their views regarding the need for co-operative activities. It was also agreed that the organization could carry out various features to boost the community and the district, as well as trade interests.

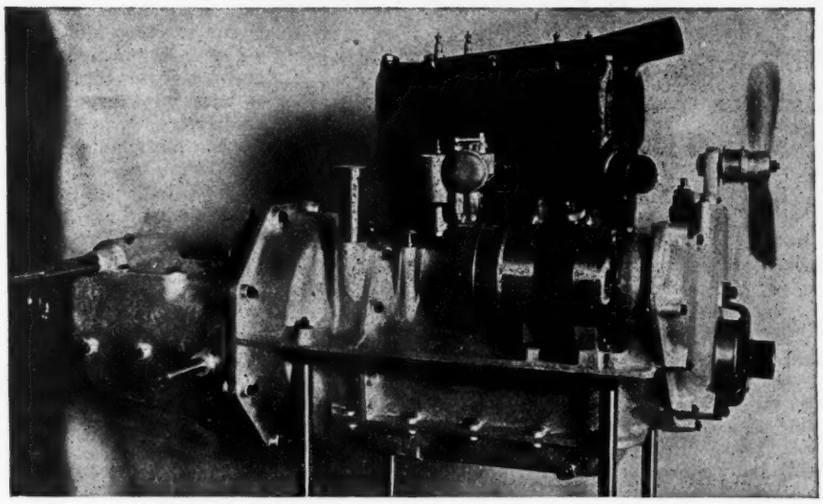
The completion of the Prescott Highway, the possibility of much tourist traffic in the future, the establishment of increased business facilities in the capital, the holding of more automobile social features, and other subjects, led to the opinion that a general association was essential. There is also the prospect of a big automobile show in the capital next January, while the new association hopes to cooperate to a considerable extent in the holding of the next Inter-City Reliability Tour.

The official name of the organization is the Automotive Trade Association of Ottawa, to cover all branches of the allied industry. A motion to organize separate sections for the respective branches was voted down, the rejection of the proposal being practically unanimous. There is a possibility that the new organization will become affiliated soon with the Retail Merchants' Association.

Officers were elected to a number of posts, the permanent chairman being W. M. Gladish, automotive editor of the Ottawa Journal Press. The vice-chairman is S. C. Cooke, the secretary-treasurer, elected provisionally, is William McDonald. Chairman for the various committees were elected as follows: Grievance—G. J. Doane, Canadian General Electric Co.; Features—Corliss Keyes; Entertainment—J. G. McGuire; Rules & Regulations—George Pink, of Pink & Blackburn; Publicity and Advertising—D. J. McGowan, of the Dixon Motors (Ottawa), Ltd. chairmen of the membership and other committees will be selected later. These chairmen were given power to organize their own committees, subject to the approval of the whole body of the association.

The next general meeting of the association will be held shortly at the Ottawa Hunt and Motor Club, this meeting taking the form of a dinner. The new organization will not deal exclusively and entirely with trade details, but will arrange many unusual and attractive features, according to indications. The secretary of the meeting was Mr. Sidney Cooke.

An Engine from the Paris Show



Chapuis-Dornier engine complete with gearbox and self starter

Detroit Building Boom Keeps Trade

DETROIT, Nov. 1—Building permits aggregating $4,034,350, which include permits for 692 new buildings, the majority being residences and apartments, evinces the determination of Detroit to overcome the critical situation as regards housing. All agencies are at work in the effort to provide suitable homes for the hundreds who now are huddled together in cramped quarters, many of them living in public buildings and lodge halls.

The lack of accommodations is proving a serious handicap to the automobile industry. Factories are unable to get even common labor sufficient to man the plants simply because of lack of living quarters. The sound of saw, hammer and trowel are heard throughout the city and no time is being lost in construction once the permit has been secured.

The permits issued last week reached very close to the record week in Detroit's history, but one other week showing a greater total. That was a time when the General Motors Co. took out a permit for several large buildings. Last week's total can be realized when it is compared with $1,546,825 for the week prior and $202,036 for the same week one year ago. Permits for additions and alterations to 107 buildings, aggregating $1,169,750, were included in the total.

British Air Mail Pronounced Success

WASHINGTON, Nov. 6—An air mail service between Bristol, Birmingham, Newcastle, Manchester and Glasgow, in England, has operated successfully thus far, according to a report from the American Consul General. Letters for these cities are received at the central offices in London up to 9 p. m. and return services are due to arrive in London from the cities at 12 o'clock noon every day.

On Sept. 30, 54 government airplanes were employed in transporting mails from one part of the country to the other; also on that date 1,400 lb. of letter mail were taken by a Handley-Page plane to Brussels for forwarding to Holland and Norway. On its return trip the same machine brought back 2,000 lb. of continental mail.

Other airplanes carried mail to Paris. Some other machines under civilian contract, with a total mail-carrying capacity of 4,750 lbs., also have left London for Bristol, Birmingham, Newcastle, Manchester, and Glasgow. The charge for carrying letters by airplane is 2s. (49 cents) an ounce, plus the ordinary rate of 1½d. (3 cents) an ounce.

This airplane service has been started under favorable conditions, as the weather during the past week has been fairly clear and with an absence of fog to impede flying.

AIRPLANE FIELD FOR EDUCATOR

WASHINGTON, Nov. 1—The Ecuadorian Government some months ago sent an army officer to Chile to learn aviation and since his return has appointed him to teach aviation at the Military and Naval College in Guayaquil, states a Commerce report. To advance aviation further, the government is assisting the Guayaquil Shooting and Aviation Club with an annual grant of 4,000 sucres ($1,947) to form an aviation field camp near Quayaquil, where the practical features of the subject can be taught. Consul General Goding reports that the Ecuadorian Government has declined to assist in a plan to carry mail between Guayaquil and Quito by airplane; however, an American company is considering the practicability of an airplane for passengers and freight between Santa Rose and the mines at Portobello, since the route now used is dangerous and often impassable.

HAMILTON TIRE CO. FORMED

DETROIT, Nov. 1—The Hamilton Tire & Rubber Co., capitalized at $50,000, has been authorized to do business in Michigan. All of the directors are Detroit business men.

FORM NEW WORLD TRADE COUNCIL

Co-operation Between Europe and America to Meet War's Aftermath Assured

ATLANTIC City, Oct. 29—The foundation of an international organization of business men was laid here at the meeting of the International Trade Conference which recently ended its sessions. Four commercial missions, one each from Great Britain, France, Italy and Belgium, joined with representatives of the Chamber of Commerce of the United States in planning the organization.

The foreign delegates are starting from Atlantic City on a tour that will take them to many large industrial cities. The towns to be visited are: Philadelphia, Washington, Pittsburgh, Cincinnati, St. Louis, Kansas City, Chicago, Detroit, Cleveland, Niagara Falls, Buffalo, Rochester, Boston and New York.

Chairman Beford said in his opening address before the assembled conference:

"The supreme need of the world is that Europe and America shall be restored to the utmost productivity without a moment's delay. To accomplish that there must be co-operation between Europe and the United States."

The Conference has, as was hoped, proved a powerful instrument toward this end. The subjects covered were foodstuffs, reconstruction supplies, petroleum, textiles, shipping, credit and finance, metals, coal, chemicals and permanent organization. Each subject was covered by national leaders in their particular field.

Throughout the general sessions, the reports of the various committees were read as completed and finally revised. These reports gathered together statistics of Europe's needs and presented and classified the main items to form what is perhaps the most valuable body of factual testimony as to the economic aftermath of the war that has yet been produced for the information of the business men of all countries.

But aside from facts, which never in themselves offer solution of any difficulty, the spirit of co-operation pervading the conference and the spirit of sincere friendship and frank agreement points to realization of the best hopes of the business world.

Prairie Dog Tractor to Have Successor

KANSAS CITY, Nov. 3—The Kansas City Hay Press Co. has buried its Prairie Dog tractor. It is, however, designing a new tractor now being tested. The company has laid the foundations of a building 150x300 ft. adjoining its hay press plant, on which a factory will be erected next spring for the tractor. Mr. Swan, of the company, said:

"We killed the Prairie Dog ourselves, by failing to give it exercise, fresh air and nourishment. It was a good tractor, and somebody could take it now, and make a killing with it. Prospective buyers and dealers who had seen it work, and liked it, came to us for tractors and for contracts—and we were not in a position to deliver. We had done everything to make the tractor a success, except to make the tractors to deliver. It was humiliating, to have to confess that we couldn't supply the thing that we said we had and that people wanted. And we can't go back now and catch up that prestige; we are going to forget the Prairie Dog."

General Motors Truck Denies Move Rumor

DETROIT, Nov. 1—The General Motors Truck Co. will not be moved from Pontiac to Detroit. W. L. Day, general manager of the truck plant, put an end to reports that the plant would be transferred to the site secured by General Motors Co. when it took over the Cadillac Motor Car Co. in 1915 today.

"There is absolutely nothing to it. The truck plant will remain at Pontiac. That has been definitely decided," said Day.

The reports published in local papers were to the effect that a factory 360x1,800 ft. with 1,300,000 sq. ft. of floor space would be erected on the Cadillac site which is in close proximity to other units of the General Motors company.

New York Body Shops Tied Up by Strike

NEW YORK, Nov. 7—All of New York's large automobile body and carriage builders are still tied up by the strike of 1,200 members of the United Automobile, Aircraft and Vehicle Workers of America.

The men walked out nearly a month ago, demanding a 44-hour week and wage increase averaging about 15 per cent. It is reported that a few of the smaller shops granted the demands of the men, and that in a few others the workers returned at the old scale of wage and hours, but there is no indication that the larger shops are any nearer a settlement with their employes than they were three weeks ago.

About 100 shops in and about Manhattain are affected.

ROADS GET 22,000 TRUCKS

WASHINGTON, Nov. 3—Congressman Reavis has introduced a resolution which provides for the transfer of 22,000 motor trucks and other vehicles from the War Department to the Bureau of Public Roads and for the immediate public auction of all other surplus Army motor vehicles.

PRESTON 1920 OUTPUT SOLD

BIRMINGHAM ALA., Oct. 30—The Preston Motors Corp. through R. A. Skinner, president and engineer, has contracted for buildings to cost more than $88,000 to provide for plant expansion and increased production.

President Skinner has announced that the 1920 production of the company has been sold.

PROGRAM FOR THE OHIO CONVENTION

Men Prominent in Industry to Speak on the Annual Gathering

CLEVELAND, Nov. 5—Men prominent in the automobile industry will come from many states to speak at the annual four-day convention here of the Ohio Automobile Trade Association Dec. 3 to 6. Every part of Ohio will be represented and Victor Moon of Columbus, secretary of the organization, says that approximately 1,500 delegates will be in attendance.

Among the prominent figures in the automobile world who are on the program are F. W. A. Vester of St. Louis, president, and Harry Moock, secretary of the National Automobile Dealers' Association.

Pyke Johnson, secretary of the good roads committee of the National Automobile Chamber of Commerce, is expected to give the delegates a message of special significance. Dealers' problems, on which he is an authority, is the topic of an address by George M. Graham, general sales manager of the Pierce Arrow Motor Car Co. of Buffalo. Edward S. Jordan of the Jordan Motor Car Co. of this city is on the program for a talk about trade conditions.

The association is divided into seven trade divisions and round-table discussions will be indulged in by each group daily.

General Motors Corp. Builds at Meriden

BOSTON, Mass., Nov. 3—Contract for what is virtually a new plant at Meriden, Conn., for one of the subsidiaries of the General Motors Corp. The New Departure Manufacturing Co., has been let to the Aberthaw Construction Co., of this city. The entire order amounts to nearly $2,000,000 and includes the erection of four new buildings at Meriden and the remodeling of an old building, which was formerly operated as a woolen mill, together with the construction of one new building at the West Hartford plant.

SUPPORT ROAD LEGISLATION

COLUMBUS, O., Nov. 3—Motor car organizations, good roads federations and good roads enthusiasts are supporting the proposed amendment to the Ohio constitution, providing for the classification of property for taxation purposes as it is believed it will partly, at least, solve the tax problem and give greater amounts for road improvement and maintenance.

MORE CLOSED CARS PLANNED

KOKOMO, IND., Nov. 5—Fifty per cent of the automobiles produced next year by The Haynes Automobile Co., Kokomo, Ind., will be closed styles, according to plans recently announced. The other fity per cent will be open models.

NELSON TRUCK HAS NOVEL FEATURES

Straight Line Drive and Radiator Shutter Control on Latest Model

DETROIT, Nov. 1—A number of new design features have been incorporated in the new 3½-ton model of the Nelson Motor Truck Co., one of particular interest being the straight line drive which is secured by mounting the engine at an angle of 2 deg. and 20 min. on its base. This does not effect the lubrication, as the Buda engine used has full force oil feed.

The four-speed Brown-Lipe gearset has an extended countershaft and special apertures for power take-off installations so that a winch, hoist and tire pump can be mounted on the same chassis and all operated off the transmission. At the front or driving end of the rear spring, the first leaf forms the driving eye and the second leaf is wrapped around the eye-bolt to provide for safety should the top leaf break.

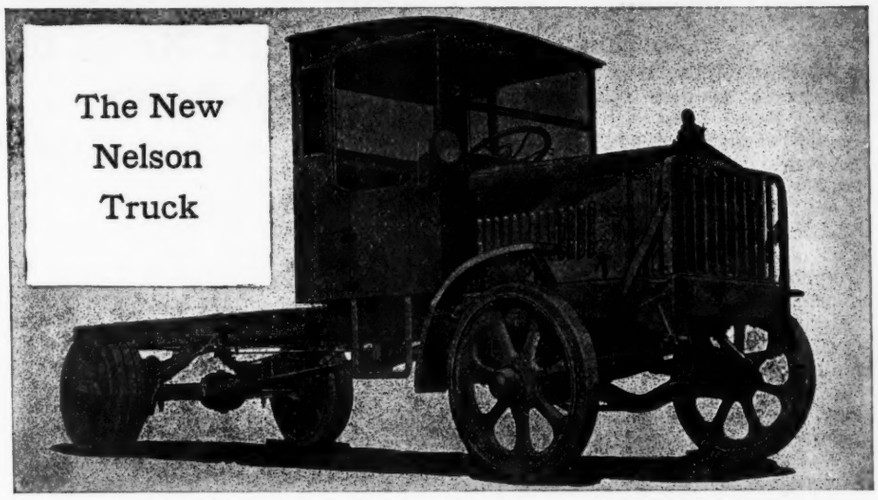
Among the unusual features of equipment are radiator shutters which are manually controlled from the driver's seat, in connection with a Motometer. The fan is designed with a shroud. Protection of the radiator is afforded by a radiator guard mounted independently, set 6 in. ahead and braced diagonally.

A spring drawbar is provided at the rear of the chassis for hauling a four-wheel trailer. Pig-tail towing hooks are mounted on the front frame corners.

Lubrication is by the alemite system, the 5-lb. grease gun and hose necessary for this system being provided in the tool equipment. In mounting the gasoline tank, a steel sub-frame is bolted to the main frame through the web of the channel. The 30-gal. gasoline tank is of irregular shape and is held on the sub-frame by means of steel straps attached to adjustable anchor bolts. On this same frame is mounted the steel cab with doors and curtains mounted on a frame which slides like a sedan window into panels provided in the doors. The cab is of steel, with the exception of the top which has a wooden frame work. A rain vision windshield set in rubber is provided. An electric lighting outfit is included in the equipment.

The power plant employed is a Buda U model, 4½x6 in., with three-point suspension. The front end of the engine is supported in a pilot bearing which allows for the twisting motion of the frame. The rear axle is a Clarke internal gear type with a reduction ratio of 10.1, while the front axle is of Standard parts make.

This new design of truck is the first of a series of Jumbo models that will include trucks having 3,000 lb., 4,000 lb., 5,000 lb., 6,000 lb., 7,000 lb. and 8,000 lb. capacity. The weight of the 3½-ton chassis is 6,400 lbs., with a body allowance of 2,000 lbs. On solid tires the truck is given a pay load capacity of 7,000 lbs. and on pneumatics of 8,000 lbs.



Details of this novel truck are given in the left column of this page

Power Farm Machine Shown at Plowing Meet

OTTAWA, Nov. 3—The first annual interprovincial plowing meet and tractor demonstration of the Eastern Ontario and Western Quebec Plowmen's Association just concluded was an unqualified success.

It attracted thousands of visitors from a territory where little has been seen of the new application of farm power. The entries exceeded expectation, there being about twenty models represented and twice that number of machines in operation.

In addition to the tractors, there was a formidable array of milking machines, threshers, plows, hay-loaders, manure-spreaders and gas engines. The total value of the exhibits ran into hundreds of thousands of dollars.

To give the city people an idea of the extent and nature of the show a parade was arranged through the main streets of Ottawa on Monday afternoon. There were included in the line-up practically all of the tractors and motor trucks, most of them from Canadian firms, but several from the United States, Milwaukee and New York firms contributed to the list, making the affair truly an international exhibition.

Many expressions of commendation were heard from the manufacturers represented and from many visitors for the efficient manner in which the whole demonstration was handled.

The manufacturers of modern farm power machinery who made exhibits at the tractor demonstration report that they were successful in making a large number of sales.

CHANDLER ADOPTS AIR SERVICE

CLEVELAND, Nov. 5—Express companies and mail service proving inadequate to get parts from Chicago to the Chandler Motor Car Co., in Cleveland, the factory is now employing airplanes to deliver parts between these two points, the company announces.

Dividend Rate of Studebaker Increased

SOUTH BEND, IND., Nov. 6—The annual dividend rate on the common stock of the Studebaker Corp. has been increased from 4 to 7 per cent, by declaring 1¾ per cent quarterly, and the directors have made the new rate retroactive over 1919 by declaring an extra distribution of 2¼ per cent on the junior stock issue.

According to a statement by A. R. Erskine, president, the net profits of the corporation, after reserve for Federal taxes, were about 11 per cent, in the first six months of the year when operations were below normal on account of the reorganization from war to commercial basis. The net profits for the third quarter, after deducting $2,000,000 reserves for Federal taxes and contingencies, were 11 per cent net on the company's common stock.

The liquid assets of the corporation at the present time amount to $18,000,000 consisting of cash, government bonds and certificates of indebtedness, marketable securities, loans, sight drafts outstanding and verified balances due from the U. S. Government on the outstanding war contracts.

Kansas City Tractor Show Is Sanctioned

NEW YORK, Nov. 7—The National Tractor Show, which will be held at Kansas City, Feb. 9-14, has received the official sanction of the show committee of the Tractor Division of the N. I. V. A. and of the Motor and Accessory Manufacturers' Association. The tractor show committee decided to approve the show irrespective of the conflict in dates between it and the show previously authorized for Wichita. A settlement of the conflict has been left to the associations at Kansas City and Wichita. The approval by the M. & A. M. A. will result in a much larger accessory display than there was at the Kansas City show last February.

Current News of Factories

Notes of New Plants —Old Ones Enlarged

Antigo Company to Build Tractor

ANTIGO, WIS., Nov. 3—The Antigo Tractor Co. has been incorporated with a capital stock of $500,000 by a number of Antigo capitalists who have backed D. S. Stewart, designer of a new type of tractor, in his experimental work for two years. The design is ready to go into quantity production and it is planned to erect a factory costing $125,000 in Antigo. Output will be provided at once in leased quarters. The Antigo tractor will be known as the "Four-Wheel-Pull" because its transmission system is in the nature of pulling rather than drawing. Charles W. Fish, a leading lumber operator, is president and L. P. Tradewell is secretary.

HUDSON BUYS STRICKLER CO.

JANESVILLE, WIS., Nov. 3—The Hudson Mfg. Co. of Minneapolis, Minn., has acquired the major interest in the Strickler Hay Tool Co. of Janesville, Wis., and will conduct the business as the Hudson Mfg. Co., a Wisconsin corporation with a capital stock of $200,000. The production will be enlarged to embrace other power farm machinery for use with tractors, besides hay tools. Frank B. and Jay C. Strickler and C. L. Cox, former owners of the Strickler company, continue their association with the new owners. The plant will be enlarged.

FORD BUYS CANADIAN PLANT

DETROIT, Nov. 1—The Ford Motor Co. of Canada has purchased the properties of the Dominion Stamping Co., the transfer involving an outlay of approximately $750,000. The manufacture of fenders, sheet metal work and other automobile equipment made by the stamping company will be taken over by the Ford company.

WILL MAKE PORTABLE STOVES

MILWAUKEE, WIS., Nov. 3—The Auto-Kamp-Kook-Kit Co. is a new corporation here with $25,000 capital, formed to engage in the manufacture of portable gasoline stoves and accessories for motorists. The incorporators are Gilbert M. Prentiss, Fred E. Krueger and Edwin J. Liebstueck.

SPECIALTIES MAKER TO BUILD.

NEW YORK, Nov. 3—The Raymond Engineering Corp., with offices at 309 Lafayette street, manufacturer of Hilton high pressure tire pumps and other metal specialties, has purchased 15 acres of land at Farmingdale, L. I. Work on the first two units of a plant there will be started immediately.

The Raymond Co. recently has closed contracts for their products amounting to over $2,500,000.

NEW TRAILER CO. FORMED

CLEVELAND, Nov. 3—The Tracking Trailer Co. has been incorporated with a capital of $150,000 to manufacture and sell a new trailer. The incorporators are F. P. Van Der Veer, T. M. Van Der Veer, Charles Brown, Max P. Goodman and Benj. Feinsilber.

TIMKEN TO INCREASE STOCK

DETROIT, Nov. 1—Timken-Detroit Axle Co., of Canton, O., in a letter to stockholders announcing a special meeting Nov. 26, asks a vote on a plan to increase the capitalization from $6,000,000 to $48,000,000. The plant would increase the common stock from $3,000,000 to $30,000,000 and reduce the par value from $10 to $1 and provide an issue of $15,000,000 seven per cent cumulative preferred stock in addition to the $3,000,000 outstanding. It is planned to issue $5,000,000 preferred at once and allow common stockholders to subscribe at par in proportion to their holdings.

DEXTER COMPANY MOVES

NEW YORK, Nov. 1—The I. H. Dexter Company, Inc., will on Dec. 1 move their office and plant to their newly acquired building at Goshen, N. Y.

The Dexter Co. has for the past six years confined its entire efforts to the production of couplings for use wherever power is transmitted flexibly.

SIX-WHEEL TRAILER TO BE MADE

FOX LAKE, WIS., Nov. 3—Articles of incorporation have been filed in behalf of the Six-Wheel Truck Co. of Fox Lake, Wis., organized with $60,000 capital to manufacture the six-wheeled motor truck-trailer combination developed by F. N. Pettegrew. H. M. Howard and W. C. O'Connell are associated with the enterprise. The new vehicle is designed to carry both passenger coach bodies of large capacity for handling bulky loads.

WILL MAKE HUBS FOR FORDS

DANVILLE, ILL., Nov. 3—The Allith-Prouty Co., with factories here, has arranged to supply Ford car front and rear hubs. The hubs will be made from the casting to the finished product, the company having its own malleable iron foundry and having recently added excellent facilities for handling the finishing of the hubs.

FRANKLIN FACTORY BUILT

SYRACUSE, N. Y., Nov. 1—Record making strides are being made in the construction of the new units in the $1,000,000.00 building program of the Franklin Automobile Co. Possession has been given of the ground floor of the new half-million dollar manufacturing plant on the site of the present works. Two months ago the site was a vacant lot. Now the company has possession of one floor and the building is nearly completed. It will be seven stories high.

Militor Motors Corp. Buys Springfield Plant

SPRINGFIELD, MASS., Oct. 29—Announcement is made of the sale of the plant of the Knox Motors Co., Springfield, Mass., to Neil R. Sinclair of New York, president of the Militor Motors Corp. The Knox Motors Co. reserves the right to use a part of the buildings for its needs for two years.

The Knox company has been identified with the motor industry for many years, and will continue the manufacture of its present products as well as parts for its former models at the Springfield plant. It is understood that the company has plans under consideration which will increase and round out its present lines.

KNOX TIRE CO. ORGANIZED

MT. VERNON, O., Nov. 3—The Knox Tire & Rubber Co., which was organized recently with a capital of $2,000,000, has prepared plans for the erection of a large tire and rubber factory, which will cost about $400,000. The general offices of the company are located in rooms 10 to 14, Clinton Bldg., Columbus, Ohio. A location has been secured within a half mile of Mt. Vernon on the Kokoshing River, which gives ample water supply. It is expected to have the plant in operation soon after Jan. 1. B. E. Frantz is president and V. V. Hendershot superintendent.

THE BUCKEYE PLANT ENLARGED

FINDLAY, O., Nov. 1—The Buckeye Traction Ditcher Co. plans additions to its plant that will require the employment of 150 more men. A foundry to cost $75,000 is being constructed among other extensions.

HYDRAULIC HOIST CO. MOVES

MILWAUKEE, WIS., Nov. 3—The Horizontal Hydraulic Hoist Co., established in Milwaukee several years ago, has moved its plant and headquarters to Detroit, Mich., where the company has been reincorporated with a capital stock of $100,000. Edward R. Bacon, founder of the business, continues as president and general manager. The company manufactures hydraulic hoisting appliances for application to dump-body trucks and general hoisting purposes.

WILL MAKE OIL CUPS

ALMEDA, MICH., Nov. 1—The Autoware Corp., of Detroit has leased a large building here and is installing machinery and equipment for the manufacture of oil cups for automobiles. The plant will employ fifteen persons at the start and it is announced that other automobile accessories will be manufactured later on.

STEWART TRUCK DIVIDEND

BUFFALO, Nov. 7—At a meeting of the directors of the Stewart Motor Corp. makers of Stewart trucks, which was held Nov. 1st, the regular quarterly dividend of 2 per cent on the preferred stock was declared as well as a 2½ per cent dividend on the common stock.

Gordon Heads Selden Officials

ROCHESTER, N. Y., Nov. 5—Stockholders of the Selden Truck Corp. have elected the following officers:

Geo. C. Gordon, president; Wm. C. Barry, vice-president; R. H. Salmons, vice-president, and Hal T. Boulden, vice-president. W. F. Reynolds, who is now in London, was also elected to the office of vice-president, looking after Selden interests in foreign countries.

Chas. S. Stearns, of Rochester, who has been a director, will continue, as will R. H. Bollard who recently was added to the directorate as a representative of the New York financial interests. Other officers elected were E. B. Osborn, treasurer; S. P. Gould, secretary and F. J. Kolb, assistant treasurer.

Plans were approved for enlarging the plant to take care of the increased business. The meeting was the first of the combined Selden companies and now that the details of the merger have been completed, the corporation will at once take over the manufacturing of Selden trucks, formerly carried on by the Selden Motor Vehicle Co., which company, by reason of these changes, will in time lose its identity in the motor truck field.

FIELD SELDEN SALES MANAGER

ROCHESTER, N. Y., Nov. 3—L. N. Field, president of the Associated Motors Co., has been announced as Western Division sales manager of the Selden Truck Corp., a newly created post, with headquarters at 995 Market Street, San Francisco.

As Western Division sales manager, Field will look after the interests of the Selden corporation for the Pacific states, including Idaho, Nevada, Washington, Oregon, Utah and Arizona.

George F. Shaw, who has been located in Detroit as representative of the Mansfield Steel Corp., left Saturday. He will open a branch at Baltimore for a Detroit banking house.

Charles Noble, of Brown City, Mich., a director in the J. C. Wilson Co., manufacturers of the Wilson truck, has been elected treasurer of the company. He is a banker at Brown City.

J. E. Pickens, transportation engineer for the Federal Motor Truck Co., left Monday to assume the duties of advertising manager of the Selden Truck Corp., of Rochester, N. Y., in charge of engineering.

George Carlson, traffic man at the Portland, Ore., branch of the Ford Motor Co., has been promoted to assistant manager of the new Ford assembly plant at Copenhagen, Denmark. His knowledge of the Danish and Swedish languages was a factor in his selection.

F. A. Petrie, director of sales for the Dort Motor Car Co., in South America, reports a ready market for American cars in Brazil and Argentina.

J. A. Bennell, formerly special representative of the Haynes Automobile Co., Kokomo, Ind., is now assistant general manager.

Men of the Industry

Changes in Personnel and Position

PACKARD ANNOUNCES PROMOTIONS

DETROIT, Nov. 5—The Packard Motor Car Co., following its policy of promotions within the organization, has named E. G. Gunn and A. Moorhouse to succeed O. E. Hunt, chief engineer passenger car division, and H. D. Church, chief engineer truck division. Gunn for several years has been carriage engineer under Hunt and Moorhouse has been truck engineer under Church.

Hunt and Church left the Packard organization Nov. 1 to become associated with Emlem S. Hare and Henry Lansdale, formerly of the Packard company, who are at the head of the Mercer Motors Co., of Trenton, N. J. Hunt becomes vice president in charge of production and engineering and Church vice president in charge of truck development. A successor to Hare has not been announced.

G. L. McCain, a former member of the Packard organization who resigned at the outbreak of the war to assist Col. J. G. Vincent on government work, has returned and assumed the duties of carriage chassis engineer.

Announcement also is made that Lieut. Col. Charles B. McClure, who was in charge of the trans-continental tour of the U. S. Army motor transport, has joined the Packard forces. Colonel McClure entered the army in 1905 and saw service in the artillery, infantry, machine gun and motor corps in the island possessions and spent a year in France. His connection with the Packard company has not been given out.

Malcolm H. Sherwood, of Chicago, has assumed charge of the South Bend branch of the Packard Motor Co., of Chicago. Sherwood succeeds C. F. Moore, who is detailed to Chicago in the truck department.

Kenith L. Morgan, of New York, has resigned from the Colt-Stratton Co., and shortly will announce his connection with another automobile company as director of sales promotion and advertising development.

Gilbert U. Radoye has been made director of advertising of The Haynes Automobile Co., Kokomo, Ind.

A. H. Masters, for many years associated with the Westinghouse Electric and Manufacturing Co., has resigned to become general manager of the Samson Motor Co., Pittsburgh.

Albert H. Mitchell has announced his resignation from the Taft Peirce Mfg. Co., of Woonsocket, R. I. He is now associated with H. W. Cotton, Inc., of Brooklyn, as second vice president and sales manager.

NEW RAINIER MANAGERS

NEW YORK, Nov. 6—Many additions and several changes in the salesforce of the Rainier Motor Corp., Flushing, L. I., are announced.

Capt. W. A. Fisher, who served with the Motor Transport Corps in France, has taken the management of Rainier truck sales in New York state, with headquarters at Rochester. J. B. Larkin has returned from war work to accept the management of the New England territory, with headquarters at Boston. Charles H. Gresslee has been appointed sales manager for the Middle West. George F. Brandenberg has accepted the salesmanagership for Maryland, Delaware and District of Columbia. S. E. Bennett will have charge of the Pennsylvania territory and R. B. Miller will act in a similar capacity for the territory comprising Southern Ohio, Tennessee, Kentucky and West Virginia. K. J. Leach is the new manager of the territory comprising Texas, Louisiana, Arkansas and Oklahoma.

AIR COMMISSION NAMED

ALBANY, N. Y., Oct. 28—Governor Smith has appointed a state aviation commission to study and promote aeronautics. It is to make suggestions for airplane regulatory bills to be introduced at the next session of the legislature.

The members, who will serve without compensation, are: Col. Jefferson De Mont Thompson, chief of the New York air service police reserves; Robert Graves, of New York; Col. Archie Miller, commander at Hazelhurst Field; Senator Frederick M. Davenport, of Oneida county, and Assemblyman John F. Shannon, of Troy.

CHANGES IN J. I. CASE PLANT

Ellis Chadwick is now manager for the J. I. Case Threshing Machine Co., at Kansas City. He succeeds W. C. Giberson, who resigned to become sales manager for the Holt Manufacturing Co., at Peoria. Chadwick began business life in the stock room at the Case factory, worked at the Kansas City branch a year, and for ten years has been manager of the Oklahoma City branch. He was succeeded at Oklahoma City by C. T. Bishop, previously manager for the same company at Denver. B. E. Mead is assistant manager at Kansas City. W. R. Ellis, formerly assistant manager here, has been made manager at St. Louis.

Tom Moore, well known through his many years' connection with the trade, has joined the sales forces of the Stanwood Rubber Co., of Newark, N. J.

TO GATHER TRACTOR FACTS

WASHINGTON, Oct. 29—The Department of Agriculture is co-operating with the Census Bureau in the taking of farm census and among other statistics it will gather information relative to tractors, passenger cars, motor trucks, lighting systems, etc. Questions have been compiled which will result in determining the numbers of tractors, cars and lighting systems in use.

Calendar

SHOWS

Nov. 16-23—New York Automobile Salon, Hotel Commodore.

January—New York, International Automobile Mfrs.' Congress.

Jan. 3-10—New York, N.Y. Grand Central Palace, National Automobile Chamber of Commerce. S. A. Miles, Manager.

Jan. 3-10—New York City. Eighth Coast Artillery Armory, commercial cars and accessories.

Jan. 8—Chicago. Airplanes, Manufacturers' Aircraft Association. Congress Hotel.

Jan. 17-24—Cleveland. Nineteenth Annual Automobile Show, Cleveland Automobile Mfrs.' and Dealers' Assn., Wigmore Coliseum.

Jan. 24-31—Chicago, Ill. Coliseum. Cars: Drexel Pavilion. Trucks: National Automobile Chamber of Commerce. S. A. Miles, Manager.

Jan. 24-31—Chicago. International Amphitheater, commercial cars and accessories.

Jan. 31-Feb. 6—Kansas City, Mo. Annual exhibition, Overland Bldg. E. E. Peake, Manager.

Feb. 9-14—Nashville, Tenn. Nashville Automobile Trade Association.

Feb. 21-28—Ottawa, Ont. Motor Show.

Feb. 23-28—Louisville, Ky. Twelfth annual exhibition, Louisville Automobile Dealers' Assn., First Regiment Armory.

February—Chicago. International Automobile Mfrs.' Congress.

February—Deadwood, S. D. Annual show, Deadwood Business Club. F. R. Baldwin, Manager.

FOREIGN SHOWS

November—Christchurch, N. Z. First National Motor.

Nov. 7-16—London. Olympia Motor Car Exhibition — Society of Motor Mfrs. and Trades.

December — Brussels. International Automobile Mfrs.' Congress.

Dec. 19-Jan. 4—International Aviation Exhibition, Paris, France.

January — Glasgow. Scotland Scottish Motor Exhibition.

February — Manchester, Eng. North of England Motor Exhibition.

Feb. 23-March 6—Birmingham, Eng. British Industries Fair.

March—London, Eng. Motor Boat, Marine and Stationary Engine Exhibition.

March—Adelaide, Australia. All Australian Exhibition of motor vehicles, airplanes, engines and automotive equipment.

March 1-15—Lyons, France. Automotive Products. Lyons Industrial Fair.

April or May — London, Eng. Commercial Vehicles Exhibition, Olympia.

April 3-May 4—Buenos Aires. Exposition of U. S. manufactures.

Nov. 3-8—Phoenix, Ariz. Tractor Demonstration, Arizona State Fair.

TRACTOR SHOWS

Nov. 22-29 — Jacksonville, Fla. Florida State Fair and Exposition. B. K. Hanafourde, Manager.

Feb. 9-14—Kansas City, Mo. Fifth Annual Kansas City Tractor Club. Guy H. Hall, Manager.

Feb. 9-14—Wichita Kan. Tractor and Farm Machinery, Forum, Wichita Thresher-Tractor Club.

CONTESTS

Nov. 27—Los Angeles, Cal. Ascot Speedway race.

Dec. 29—Los Angeles, Cal. Ascot Speedway race.

August, 1920 — Paris, France. Grand Prix Race, Sporting Commission, Automobile Club of France.

CONVENTIONS

November—London, Eng. Road Transport Congress and Exhibition.

Nov. 3-8—Chicago, Ill. Convention, Automotive Equipment Assn., Medinah Temple.

Nov. 7-8—Detroit. Meeting of National Assn. of Motor Truck Sales Managers, Hotel Statler.

Nov. 10—Detroit. Service Managers' Convention.

Dec. 3-5—Cleveland. Ohio Automobile Trade Assn., annual convention.

January, 1920—Washington. Pan-American conference.

Feb. 9-13—Louisville, Ky. Seventeenth Annual Convention American Road Builders' Assn., Tenth American Good Roads Congress and Eleventh National Good Roads Show.

May 15-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

Motor Trucks Move Oregon Apple Crop

PORTLAND, ORE., Nov. 1—The motor truck has revolutionized methods of transporting apples in the famous Hood River valley of Oregon, where apples are known the world over. Of the 2,000,000 boxes of commercially packed fruit harvested this season, not more than 100,000 boxes were hauled from packing houses to shipping station by the old method of horse-drawn vehicles.

It is rare for a grower with large acreage not to have his own motor truck. Truck sales in the town of Hood River to apple growers in the past season fell just short of 100 trucks. And besides this, many orchardists buying new passenger cars instead of trading in their old cars have converted them into serviceable trucks. In a single line at the receiving station of the Apple Growers' Association the other day were 19 different makes of trucks.

Motor truck transportation not only is the most convenient and quickest way of moving the valley's apple crop but orchardists declare emphatically it is also the safest. The trucks have good springs and no bruised fruit results from the journey into town. In former years shippers included in their harvest instructions specifications for springs to be used under wagon racks. The horse-drawn wagon, however, is so little used present that the paragraph of instructions pertaining to springs has become obsolete and has been dropped.

Motor trucks equipped with dump bodies are a big aid in the marketing of cull and canning apples. With boxes short and difficult to obtain, the delivery of the cull stock in the loose state helps with the box shortage. With boxes and burlap bags selling at a high price dump bodies on trucks work a big economy for the apple growers.

Big Tractor Output Is Planned for 1920

MILWAUKEE, WIS., Nov. 3—The Allis-Chalmers Mfg. Co., which has recently completed additions costing $3,000,000 to be devoted principally to the manufacture of the Allis-Chalmers tractor in three types, has decided upon an output of 7,500 tractors during 1920. It is stated, however, that facilities are available for an increase of 90 to 100 per cent in case the demand requires it.

The output for November has been placed at 300 machines, which is double the production of October, during which the additional facilities were first put into commission. On the present basis, the 1920 production will be valued at from $7,000,000 to $8,000,000, according to Fred W. Kamm, general manager of the tractor department. With the exception of General Motors and the Ford company, Allis-Chalmers will be the largest maker of tractors in the United States.

August Shows Increase in Automotive Wages

WASHINGTON, Nov. 3—Wages paid in the automobile industry in August of this year were 22 per cent higher than in August, 1918, while in the same time the numbers employed increased 18.1 per cent. Forty-seven manufacturers reported that they employed 127,664 workers in August, 1919, as compared with 108,058 workers in August, 1918, the August, 1919, payroll being $3,558,978, as compared with $2,916,503 in the same period of the preceding year. Twenty-nine establishments in the industry report a 40 per cent increase in the number of workers, with 85,970 in August, 1919, as compared with 61,359 in August, 1918.

STEEL HEARING DATE SET

WASHINGTON, Nov. 1—The Federal Trade Commission has set Dec. 2 for a further hearing on the petition of steel consumers and of the U. S. Steel Corp. that it assume jurisdiction in the controversy over retention or abolition of the Pittsburgh steel price basing point system, it was announced today. Approximately 100 statements have been submitted to the Commission from steel consumers, steel producers, allied and independent manufacturers, and others whose interests would be vitally affected by a change in the existing system.